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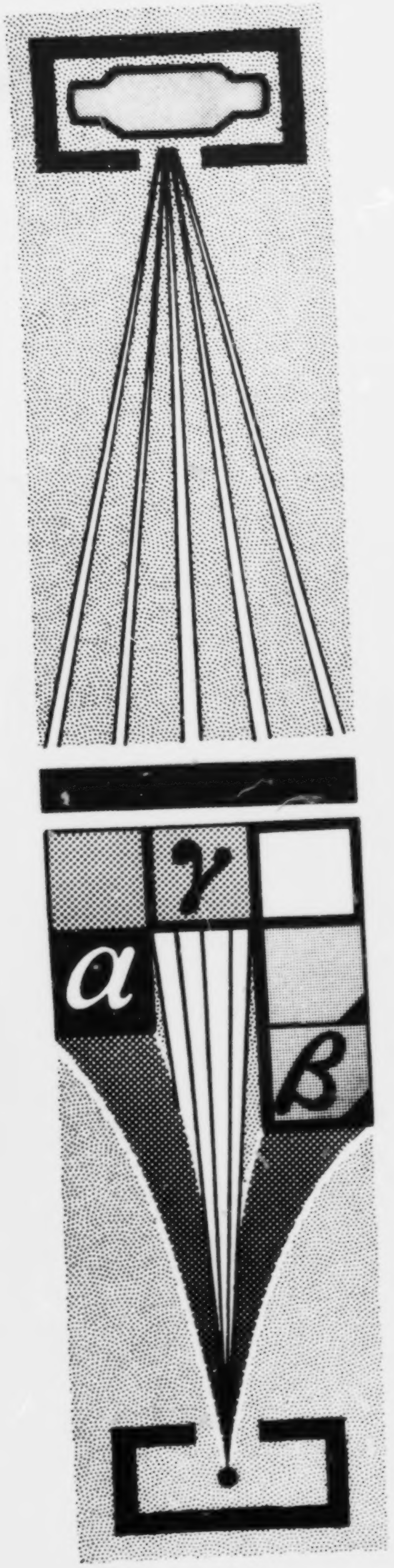

National Conference on College Affiliated Educational Programs in Radiologic Technology

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

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This publication contains the proceedings of a conference held at the University of Maryland on December 8-11, 1970. The conference sponsored by the Bureau of Radiological Health, U.S. Public Health Service, served to identify the problems encountered by radiologic technology programs in two-year colleges and to develop a compendium of information needed to promote and support such programs. Included are 1) formal presentations, 2) final reports and recommendations of the four workshop groups (curriculum, administration, manpower and external influences), and 3) information obtained in a survey of twelve selected schools of radiologic technology.

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National Conference on College Affiliated Educational Programs in Radiologic Technology

JUNE 1971

Conference held at:
CENTER of ADULT EDUCATION
UNIVERSITY of MARYLAND
College Park, Maryland
December 8-11, 1970

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
FOOD AND DRUG ADMINISTRATION
Bureau of Radiological Health
Rockville, Maryland 20852

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Chairman, Commission on
Technologists Affairs
American College of Radiology

FOREWORD

The Bureau of Radiological Health implements a national program designed to reduce the exposure of man to hazardous ionizing and nonionizing radiation.

Within the Bureau, the Division of Medical Radiation Exposure deals with 1) the reduction of unproductive ionizing radiation exposure of patients, workers, and others exposed by the use of x rays and other machine-produced ionizing radiation, radioactive materials and radiopharmaceuticals, and 2) the improvement of radiological "systems" and methodology in the healing arts.

The Bureau publishes its findings in appropriate scientific journals and in division, office and laboratory technical report series and technical note series.

The technical reports and notes allow comprehensive and rapid publishing of the results of intramural and contractor projects. The reports and notes are distributed to State and local radiological health program personnel, Bureau technical staff, Bureau advisory committee members, university radiation safety officers, libraries and information services, industry, hospitals, laboratories, schools, the press, and other interested individuals. The reports are also included in the collections of the Library of Congress and the National Technical Information Service.

I encourage the readers of these publications to inform the Bureau of any omissions or errors. Your additional comments or requests for further information are also solicited.

John C Villforth

John C. Villforth
Director
Bureau of Radiological Health

PREFACE

At the present time, most radiologic technologists are trained in hospital-based programs which do not grant educational degrees. According to the 1969 listing of AMA-approved schools of radiologic technology, fewer than 300 of the 1,257 schools were affiliated with academic institutions. Of these, 48 granted A.A. or A.S. degrees and 14 gave B.S. degrees.

In the past few years there has been a gradual shift from hospital-based programs to two-year college programs. Several explanations have been advanced for this trend: (1) Nationally, community and junior colleges, increasing at the rate of one a week, make available the type and number of educational institutions needed to collaborate with hospitals in training radiologic technologists. (2) Financial aid from local, State and Federal governments, for support of educational programs, is available only to the academic institutions. (3) States have been showing increasing interest in laws for licensure of radiologic technologists and graduation from college-affiliated programs has been required to meet the specific requirements for certification or licensing imposed by such laws. (4) The cost of hospital-based training is reflected in the fees which hospitals must charge for services. Since fees are currently subject to a host of inflationary pressures, the merit of this means of financing training is being seriously questioned.

In 1966 a National Conference on X-ray Technician Training was convened at the University of Maryland to consider the means by which present and future needs for qualified operators of medical x-ray equipment might be met. One recommendation of the conference was that a further conference be held on the subject of radiologic technology training in two-year colleges. In 1969 planning for this "National Conference on College Affiliated Educational Programs in Radiologic Technology" was begun by the Bureau of Radiological Health with assistance of consultants from the American Society of Radiologic Technologists, the American College of Radiology Commission on Technologist Affairs, the American Medical Association Council on Medical Education, and the American Association of Junior Colleges. The resulting conference, proceedings of which are contained herein, was attended by invited radiologists, other physicians, and radiologic technologists, as well as selected representatives from: teaching hospitals, community and junior colleges, Federal and State government agencies, and the professional and educational associations concerned with development and accreditation of radiologic technologists and other allied health workers.

Arve H. Dahl

Arve H. Dahl
Acting Director
Division of Medical Radiation Exposure

CONTENTS

Page

Foreword....iii

Preface.... v

Conference Summary.... xi

OPENING SESSION.... 1

Opening Statement
Moderator: *John C. Villforth*.... 3

Welcoming Remarks
Paul Q. Peterson, M.D.... 6

Some Thoughts on Health Care Delivery in the Military Setting
Keynote Speaker: *Louis M. Rousselot, M.D*.... 9

FIRST PLENARY SESSION.... 15

Review of Established School Essentials
James Pat Steele, M.D.... 17

Educational System Restraints
Edmond P. Garvey.... 21

Programs for Allied Health Careers
Kenneth M. Endicott, M.D.... 28

Present Associate Degree Training Programs
Robert Coyle, R.T.... 34

Implementing Programs
Carol Kahler, Ph.D.... 38

Conference Challenge
John C. Villforth.... 44

WORKSHOP SESSIONS.... 47

Curriculum Workshop.... 49

Overview Speaker: *F.L. Husted, Ed.D*
"Leaders, Not Leaners".... 53

Reactor Speakers:
Richard G. Lester, M.D.... 56
Philip G. Koppang, R.T.... 61
Richard B. Otte, Ph.D
"A Systems Approach to Curriculum Development".... 63

Page

WORKSHOP SESSIONS (Continued)
Curriculum Workshop (Continued)
Special Resource Speakers:
Anton Zembrod, CM Sgt.
"Training of Radiologic Technologists in the U.S. Air Force".. 71
Richard Palmer, Ph.D.
"Associate of Science Program in Radiologic Technology"....... 74
William A. McClelland, Ph.D.
"Placing Proficiency Measurement in Perspective in Radiologic Technology Training"................106

Curriculum Workshop Report..................................112

Administration Workshop...121
Overview Speaker: *John G. Caffrey, Ph.D.*......................124

Reactor Speakers:
Claude R. Snead, M.D...132
Matthew Stevens, R.T...135
Richard E. Wilson, Ph.D........................................140

Special Handout Material Submitted by Dwight Marshall:
"Survey Results of College and University-Hospital-Affiliated Programs in Radiologic Technology in the United States"...146
"Recommended Space and Equipment Needs for a College-Based A.S. (or A.A.) Program in Radiologic Technology"..............151

Administration Workshop Report..................................153

Manpower Workshop..165
Overview Speaker: *Ralph Canter, Ph.D.*
"Manpower Considerations in College-Affiliated Training of Allied Health Personnel"......................................168

Reactor Speakers:
Israel Light, Ed.D...179
Theodore T. Ott, R.T.
"Manpower Needs in Radiologic Technology".....................181
Harold D. Rosenbaum, M.D.
"Manpower Needs in Radiologic Technology".....................187

Manpower Workshop Report..192

External Influences Workshop....................................201
Overview Speaker: *Don C. Frey, Ph.D.*
"External Influences on College Radiologic Technology Programs".................205

WORKSHOP SESSIONS (Continued) Page
External Influences Workshop (Continued)

Reactor Speakers:
Robert Tumelty, Dr. P.H..211
Edmund J. McTernan
"External Influences Affecting the Education of Radiologic Technologists - A Reaction"........................216
George Koenig, R.T...220

Special Resource Speaker:
Howard Goldman, L.X.T.
"External Influences on the Development of College Programs in Radiologic Technology"........................225

External Influences Workshop Report..............................231

APPENDICES

I. Conference References and Recommended Publications.....241

II. Conference Glossary.....................................245

III. Survey Summary of Twelve College Affiliated Radiologic Technology Programs..............249

IV. Roster of Participants..................................267

V. Pictorial Highlights....................................277

CONFERENCE SUMMARY

This Conference had three objectives: (1) to identify the problems encountered by radiologic technology programs in two-year colleges and propose solutions; (2) to develop a compendium of information needed to promote and support such programs; and (3) to publish the Conference proceedings in the form of a primer for planning, organizing and operating these programs. Although it was not practical to organize these proceedings in a primer form, they do contain much of the desired information.

Invited participants included: (1) radiologic technologists, radiologists and other physicians who supervise radiologic technologists; (2) representatives of concerned colleges, college-accrediting groups, and State and local government agencies; and (3) representatives of professional associations, such as American Medical Association, American College of Radiology, American Society of Radiologic Technologists and American Association of Junior Colleges.

In the opening general session, the Conference speakers described basic problem areas. The workshops which followed began with prepared presentations. Workshop topics were: curriculum, administration, manpower needs, and external influences. The following paragraphs summarize the discussion, conclusions and recommendations of each workshop group.

The Curriculum Workshop focused on the didactic study provided by the college and the supervised clinical experience offered by affiliating hospitals. Three basic recommendations were made:

1. Proficiency examination. The group described research proposals (long range) for the development of performance criteria and measurement devices for staff radiologic technologists. A committee mechanism was recommended for overseeing the development and implementation of this kind of long-range research proposal.

2. Revaluation of curriculum requirements for college-affiliated programs. The group suggested an interim proposal in which a committee would be funded to gather significant data from existing college affiliated programs with a view toward modification of existing curriculum guidelines. It also recommended the development of a task analysis, based on job descriptions already prepared, that would serve as a basis for developing new curriculum guidelines or confirming the present ones.

3. Continued use of AMA-suggested basic curriculum. The group recommended that the current Suggested Basic Curriculum of the AMA Council on Medical Education be utilized for college affiliated radiologic technology program development until both the interim and long-range study recommendations are received.

The Administration Workshop concentrated on the required physical facilities and financial support, as well as faculty considerations, intramural relationships and revaluation of existing programs. The Administration Workshop recommended that:

1. Affiliated educational institutions should provide continuing educational opportunities for practicing radiologic technologists.

2. Affiliated colleges should offer full credit, by examination, for persons seeking college credit.

3. College affiliated programs should disseminate information about the radiologic technology program to the general public in the areas they serve.

4. A curriculum conference should be held for the purpose of developing performance criteria in establishing a two year program in radiologic technology. As a result of the proposed conference, a model curriculum would be designed and tested.

5. Each academic institution with a radiologic technology program should appoint a "technologist faculty member." In addition to fulfilling the educational qualifications of the institution, he would be a registered technologist whose experience relates directly to his teaching duties and would be required to pursue continuing educational activities.

6. Responsibility and coordination of the total program must be assumed by the college although radiographic and patient care procedures carried out during the students clinical experience would be the responsibility of the department of radiology of the affiliated health care center. Written agreements or contracts are needed in order to specify responsibility and liability. Also, adjunct faculty appointments should be made from selected hospital personnel.

7. The laboratory facilities for the college will vary with the size of the program; minimum equipment for a beginning program (15-30 students) would cost about $60,000. An energized radiographic laboratory should be based on campus, and the classroom should be equipped with modern audiovisual equipment.

8. Sources of funds for establishing and maintaining a radiologic technology program should cover faculty, equipment, and physical facilities, as well as promotion and communicative activities, administration, travel, meetings and student support.

The Manpower Workshop discussed training programs, recruitment, entrance requirements, and financial support for students. In addressing itself to the above needs, the group was guided by the need for a sufficient number of qualified personnel to perform services consistent with the requirements of good health care. In view of the absence of concrete and reliable data on the number of trained radiologic technologists, recommendations relating to manpower availability were considered highly speculative. The workshop made these recommendations:

1. Compare the hospital students and college students and develop different profiles. Also, keep the student records on a continuing basis.

2. Develop a study based on hard data to determine the number of radiologic technology graduates needed. Develop a mechanism to determine the characteristics of a good radiologic technology practitioner and apply the results in the selection of students.

3. Develop appropriate aptitude tests and interest inventories for radiologic technology; be more flexible in admissions requirements (this may necessitate providing remedial math and English courses); teach students to effectively communicate with patients and co-workers, encourage the community to identify long-term manpower needs.

4. Provide the radiologic technology program with adequate counseling and guidance services for students, beginning with recruitment and through to graduation and placement; develop a complete study program for individual students upon entry into the community college program. Survey and evaluate existing financial situations of radiologic technology college students and arrange legitimate financial support for needy students. Encourage colleges to provide opportunities for recognizing previous radiologic technology background. Provide hospital stipends when normal summer or part-time work is not practical or where students are required to serve an "internship."

The External Influences Workshop covered such factors as accreditation of educational programs, certification of students, existing State laws and government regulations, professional and community attitudes and opinions, and the employability prospects as students and as graduates. The workshop recommended:

1. A moratorium on new accrediting mechanisms until the recommendations of the Study of Accreditation of Selected Health Educational Programs have been released.

2. Formation of a forum to consider the immediate problems connected with accreditation, approval, certification and licensure.

3. Investigation of the following premises: (1) associate degree programs are more efficient, (2) college programs place educational funding on the tax or educational base, (3) college programs provide a broader base in basic sciences and liberal arts, (4) associate degree graduates have greater insight into the elements of good teaching and (5) associate degree graduates are better prepared to relate to the objectives of good patient care and safety.

4. Definition of "Essentials" in terms which do not preclude the development of innovative approaches to education in radiologic technology. Accrediting and evaluating bodies should exercise a measure of flexibility in determining Essentials, Guidelines and approval status of programs. Alternative mechanisms for evaluating competency levels attained by students should be explored.

5. Exploration of systems of seeking reasonably equitable financial rewards for similar training in the various associate degree health fields.

6. Service on local and area health planning boards by representatives of educational programs. Also suggested that consumer and student representation become a part of the health program and general college advisory board.

The workshop also:

1. Agreed that consumer protection in health care delivery can only be achieved by a responsive educational system, certification system and enforcement of protective laws and regulations.

2. Stressed the need to review Governmental policies and regulations in establishing a radiologic technology program.

3. Provided information on how to proceed in obtaining accreditation of the radiologic technology program, certification of the graduating technologists, and licensing of the technologists where applicable.

In considering the workshop reports, the final general session identified two major unresolved problems. The first was the question of remuneration of students for their hospital service. The manpower report strongly recommended that students be paid a stipend when they reached the point of actually being productive. The administrative report was opposed to any stipend as long as the student was under the jurisdiction of the educational institution. It was further noted in the discussion that stipends are prohibited by law in some jurisdictions.

The second unresolved problem concerned the physical requirements for a college-affiliated program. Some participants felt that sophisticated physical facilities were a necessity. Others felt that requirements in this area should be flexible because of funding limitations in some institutions. In particular, the location of the energized laboratory was an item of contention. Participants generally agreed on the need for students to have access to such a unit, but opinion was divided on the necessity for having the unit on the campus rather than in the hospital.

Opening Session

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Moderator:

John C. Villforth
Director, Bureau of
Radiological Health

OPENING STATEMENT

I am John Villforth, Director, Bureau of Radiological Health, Public Health Service, Department of Health, Education, and Welfare - and have the privilege of serving as the moderator of our program. As a preview of the forthcoming session here today, I wish to briefly introduce our plenary speakers:

Paul Q. Peterson, M.D.
Deputy Surgeon General, United States Public Health Service

Louis M. Rousselot, M.D.
Assistant Secretary of Defense for Health and Environment
Department of Defense

J. Pat Steele, M.D.
Chairman, Commission on Technologists Affairs
American College of Radiology

Edmond P. Garvey
President
Springfield Technical Community College

Joseph Kadish, Ed.D.
Acting Chief, Educational Program Development Branch
National Institutes of Health

Robert Coyle, R.T.
Director of Education
American Society of Radiologic Technologists

Carol Kahler, Ph.D.
Chairman, Division of Instruction
St. Louis University

I want to personally welcome you to this National Conference on College Affiliated Educational Programs in Radiologic Technology and say how pleased we are that this conference is finally underway. You all know how difficult it is to select a date and a place because of conflicting meetings and other competing activities, so we are particularly pleased by your attendance.

The Bureau of Radiological Health's sponsorship of this conference highlights its basic responsibility and concern for how radiation is used in the healing arts. Elimination of unnecessary radiation exposure depends not only on proper equipment and facilities but also on safe, efficient, and effective use of techniques for appropriately selected examinations.

To focus on this goal, the Bureau of Radiological Health established the Division of Medical Radiation Exposure and the Medical Radiation Advisory Committee. Projects supported include: assessment of population exposure to x-rays (XES-64 and XES-70); analysis of total medical use systems, including licensed users and supportive personnel; development and promulgation of standards and recommendations on radiation use; technical assistance on matters related to safe, efficient, and effective radiation use in the healing arts; and special research and demonstration projects on new techniques, methods, and systems of approach. The activities concerned with use of radiation in the healing arts have required that attention be directed to assuring that there are adequate numbers of appropriately qualified users and supporting personnel. In carrying out this function, the Bureau of Radiological Health acts as a researcher, consultant, and catalyst.

The group that has assisted the Bureau in planning and organizing this conference included representatives from the American Society of Radiologic Technologists, the American Medical Association Council on Medical Education, the American College of Radiology, the American Association of Junior Colleges, the State of New York, Emory University, and the University of Maryland's Conferences and Institutes Division of University College. This group felt that a limited participation of about 100 individuals could most effectively reach the objectives of the conference. Consequently, a large burden has been placed on each of you in attendance. We are confident that you are up to the task and only hope you share our enthusiasm for this conference.

At this time I would like to introduce the man who will make the official welcome. We feel most fortunate that he could be with us today because of a conflicting meeting and the press of business. I am pleased to present the Deputy Surgeon General of the United States Public Health Service, Dr. Paul Q. Peterson.

Official Welcome:

Paul Q. Peterson, M.D.
Deputy Surgeon General
U. S. Public Health Service

WELCOMING REMARKS

On behalf of the Department of Health, Education, and Welfare and the Surgeon General of the Public Health Service, I extend to you all a most sincere welcome. I am well aware of the importance of this conference which I hope will aid in strengthening nationwide efforts to produce adequate numbers of qualified radiologic technologists.

It is significant to note that just four years ago the then Division of Radiological Health sponsored a National Conference on X-ray Technician Training which recommended a subsequent conference on college affiliated training programs. Since then a number of college affiliated programs have been established, research and development projects have been initiated to provide guidance, and essentials for college affiliated programs have been established by the AMA Council on Medical Education and by legislation in the States of New York, New Jersey, and California.

Just last month on the Surgeon General's recommendation Dr. Roger Egeberg, Assistant Secretary for Health and Scientific Affairs, DHEW, approved a model guide for State legislation to license users of ionizing radiation in the healing arts including x-ray technologists. This model legislation developed by the Bureau of Radiological Health will also lead States to set school essentials.

I believe this conference focuses on two high priority national health concerns: delivery of health care and reduction of unnecessary radiation exposure. It will aid in improving and extending the nation's health care capability and assure the public that action is being taken to obtain adequate numbers of qualified radiologic technologists. It will also be responsive to the national concern about man's principal source of radiation.

We in the Department have been concerned about the future of radiologic technologists for many years and in many ways. Comment on some of our Congressional testimony can best describe this concern.

In the May 1968 Senate Hearings on the Radiation Control for Health and Safety Act of 1967 which became PL 90-602, consideration was given to Federal licensing of radiologic technologists. The DHEW position on this proposal was that responsibility for licensing operators and users of equipment designed to emit radiation rests traditionally at the State level. We acknowledged the need for development of model State legislation for their guidance. The Department also proposed that should State licensure not prove successful, Federal licensure may be necessary and the AEC licensing of reactor operators provides precedence for such action.

Earlier testimony on the 1967 legislation noted that: "The principal objective of the Public Health Service and other public and private organizations interested in radiation protection is to prevent exposure of the population to unnecessary radiation and to reduce to a minimum the exposures that may be necessary for medical and other beneficial application. Primary responsibility for radiation protection activities in the Public Health Service is assigned to the Bureau of Radiological Health."

Focus on radiologic technology manpower need and related problems in the radiological health sciences was provided in reports by two Public Health Service advisory bodies: the April 1966 report to the Surgeon General prepared by the National Advisory Committee on Radiation entitled "Protecting and Improving Health through the Radiological Sciences"; and, the October 1967 report of the Medical X-ray Advisory Committee entitled"Public Health Considerations in Medical Diagnostic Practice".

These reports stressed the continued growth of radiology, the shortage of physicians, and the need to rely more on allied health professionals. They emphasized three main areas with which the Public Health Service is properly concerned: equipment and installations; techniques; and clinical and other professional judgment. While equipment and installations are important considerations, the safe, efficient, and effective utilization of radiation depends on a well-trained radiological team.

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Deputy Surgeon General
U. S. Public Health Service

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A glance at the Conference Agenda and List of Participants provides a useful directory of those concerned with college affiliated education in radiologic technology. You will note our "patient," the radiologic technologist, is surrounded by: employers - mostly radiologists, administrators concerned with professional licensure and registration, educators representing associations, foundations, individual schools and medical installations, and officials of Federal and State agencies.

Time will not permit me to recognize all of the contributions made to develop and advance radiologic technology, so I shall briefly touch on a few Public Health Service programs to this wide range of interest:

> Promotion of radiation therapy technology training by the National Cancer Institute (NIH),
>
> Continuing education for allied health personnel of the Regional Medical Programs (HSMHA),
>
> Grants and contracts to improve the quality of training of Allied Health Personnel by the Division of Allied Health Manpower (BHME-NIH),
>
> Studies of: Job Descriptions, development of model college affiliated programs, and conducting on-the-job short course training by the Bureau of Radiological Health (ECA-EHS).

While I have identified selected activities of the Public Health Service, there are other large Federal contributions which will be reported on at this conference, particularly by the Department of Defense and the Office of Education.

In view of the current inflation there are hard decisions to be made on program priorities. The point I want to leave with you is that collectively the group assembled here can do a lot within existing resources to aid in creating and supporting development of college affiliated educational programs.

The objective of this conference is to develop a comprehensive report on the resolution of problems to be faced in establishing and conducting college affiliated educational programs in radiologic technology. The complexity of this task is not readily apparent. We have attempted to recognize the interests of all groups and individuals in inviting the participants to the conference. Only in a conference such as this do we realize the interdigitation that must take place to achieve our program objective.

I thank you all for coming to this most important conference and wish you success in your participation.

Keynote Speaker:

Louis M. Rousselot, M.D.,
F.A.C.S.
Assistant Secretary of Defense
Department of Defense

SOME THOUGHTS ON HEALTH CARE DELIVERY IN THE MILITARY SETTING

It is indeed a pleasure to have this opportunity to be with you today and to address such a prestigious group.

Gentlemen, the delivery of health care today is really big business - amounting to over 63 billion dollars. It employs in excess of 3.5 million in well over 100 identifiable career categories not including the craftmen, clerks and others whose skills are not primarily in the health field. It has been conservatively estimated that there is a shortage of over 200,000 in the allied health occupations and that this shortage will grow to around 400,000 in this decade. In addition, it is generally agreed that there is a shortage in all of the allied health professions including radiologic technologists and technicians.

Considering that the delivery of health care is a team effort, headed at the top by the professionally trained physician, dentist or veterinarian and supported along each echelon with personnel ranging from the highly specialized holders of doctoral degrees to lesser trained and specialized personnel with masters degree, baccalaureate degree, associate degree, certificate holder and to those with little more than a couple of weeks on the job training, I believe that health services can be made available to many more of our citizens with some innovative thinking and resultant changes in our delivery system and education and training system.

If I may digress for a few minutes, I would like to relate to you a few of the ongoing innovative projects presently being conducted in the Department of Defense. One such program that has promise of having a major impact upon future base medical facilities, is a research project known as "The New Generation of Military Hospitals". This program has just been simultaneously completed, but separately, by two competitive contractors. The Westinghouse Corporation and The Arthur D. Little Corporation. The goal of their research effort is to find ways to improve the efficiency, design and operation of our base medical health care delivery system while maintaining and hopefully improving the quality of the system. Maximum utilization of the new automation technology is a hall-mark of this project. The primary objectives of the initial program are to analyze the state of the art, the current system, and to identify areas of potential improvement to be incorporated into a prototype hospital. This base level health care system will incorporate the most advanced concepts and technology in todays health care inventory to produce a medical environment fully responsive to modern military medicine and management techniques. The equipment and operational procedures will be so designed that appropriate tasks may be transferred from the professional personnel to allied health personnel and to machines, thereby freeing the physician, dentist and other professionals to devote their energies more fully to those tasks that demand the fuller application of their professional talents. To insure that quality patient care is not lost, the prototype hospital when built will serve as a pilot study for the entire program in which the results of innovative concepts may be fully tested and evaluated under actual conditions.

The Department of Defense is continuing to work in support of the MEDIHC Program (Military Experience Directed into Health Careers). The pilot project was initiated in Texas and we are now beginning to get some feed-back on that program. Of the total 219 applicants who completed the counseling process between 15 March and 30 September 116 have been successfully placed. 67 were placed in health careers employment, 32 in health career educational programs, and 17 were placed in health care work-study programs. This represents a 53% success rate. However, this may be even higher since participants may have been placed under other state programs. It is interesting to note that 57% of those corpsmen placed, had under 6 years of service, 34% had over 16 years service while the remaining 9% fell somewhere in between. As to the interests of the applicants, 24% expressed an interest in a job, 1% in education alone and 75% in a work-study arrangement. Hopefully, as this program matures, we will be able to secure much more meaningful data.

Last December, the Army undertook a project known as the "Automated Military Outpatient System"(AMOS) at Dewitt General Hospital, Fort Belvoir, Virginia, with the goal of developing an automated information system and computer stored medical records. The first phase was the identification of the informational requirements for patient care in the general medical outpatient clinics and the development of the medical criteria and logic that govern the collection and organization of medical care data. System flow charts were developed to determine the data base required for each chief complaint, to define the patient care data required to direct patients to the proper care area and to define the patient care data required for appropriate treatment and disposition. From the flow charts, a multi-system questionnaire for obtaining history, physical examination and laboratory examinations was developed for each chief complaint. The data accumulated is fed into a computer which issues a print-out specifying what additional data is needed and/or referral of the patient to a specific clinic or the corpsman suggests the treatment schedule. He then records this information in the computer for retrieval and monitoring purposes. This project has inherent, within itself, the development and testing of standards in health care delivery which can be used to determine a more effective training program for medical and paramedical personnel as well as a method of auditing performance. The net result should be a further extension of the physician's span of services.

Another innovative project along very similar lines is the "Automated Medical Examing System" (AMES) which is being developed under contract by Philco-Ford, under the Air Force supervision. It is another highly automated computerized system of recording history and physical examinations at the Armed Forces Entrance and Examining Stations. Our experience in this project may transfer to other related areas.

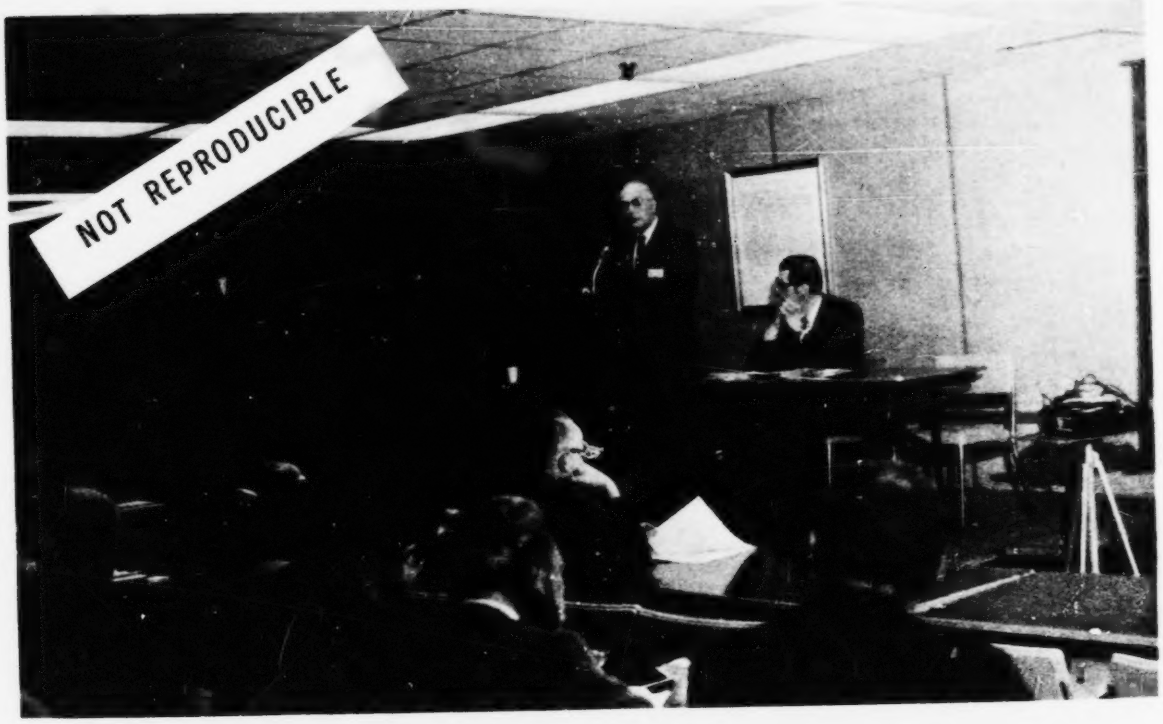
However, the addition of the most sophisticated facilities and hardware to our inventory will be meaningless unless we prepare them with adequate education, training, of our personnel and the necessary management techniques required to make them function efficiently. To this end, the Navy has a five year study, now in the second year, conducted by Technomics Research and Analysis Corporation. This is a systems analysis approach to the entire Navy health care delivery system. The current system and training have been described and the project is now concerned with job analysis and detailed task inventories for every occupational class including radiologic technology. I should emphasize that these comprehensive and systematic task analysis of the health occupations are a new exploration of a previously unsystematically charted domain of the Navy. Because of the massive volume of data gathered, computer programs are used for statistical analysis of tasks. Following this state, an education and training system will be developed to translate the job and performance requirements into specific training content and organization. The following phase will include the development of a core curricula for each of the segments that make up the Navy

Medical Department and the integration of appropriate instructional methods and techniques for all curricula. It will also include the development of curricula unique to each group and a validation of both core and specialty related curricula. The final phase will consist of programming for system management and will specify the appropriate revision of the architectural model for the education and training system that was developed in the first phase (year) of the study. If the findings of this five year study can be successfully implemented, we will have gone a long way toward solving another pressing problem faced by the Navy Medical Department today - the rational distribution of health personnel with an educational system to meet the ever increasing demand for more and better health care.

Speaking of more and better health care, it has been said there were 350 thousand employed in the health care industry in the country in 1900 serving a population of 76 million. As previously mentioned, we now have over 3 and 1/2 million in the industry. This represents a multiple of ten in the industry with only a multiple of three in the population. And we still think we are 2 hundred thousand short. This leads to what some believe to be our biggest problem today and that is the population explosion. It is interesting to note that there was about one billion people in the world in 1830. In 1930, only one hundred years later, there was 2 billion. In 1960, only 30 years later, there were 3 billion. 4 billion are expected by 1975, and 7 billion by the turn of the century. This idea has been expressed this way: "We have met the Enemy and he is us."

Over the years, it has been my observation that each profession in the allied health industry in striving for professional status and recognition goes through rather well defined stages that might be described as (1) the floundering state in which all seem to be heading in different directions without purpose of effective leadership, (2) the settling stage in which the group begins to organize and leaders begin to surface, (3) the professional organization stage in which the leadership develops fully and the group bands together for common goals, (4) the upgrading stage in which the professional quality of the group is enhanced by higher entrance requirements and the last, but not least, is (5) the reflecting stage, the one that radiologic technologists are in today. A stage in which the maturity of the organization overrides the earlier prejudices and allows a reflective analysis of where the organization is going and how it should get there. I would urge you all to participate in the sessions freely with disregard for your personal idiosyncrasies, or prejudices, keeping always the best interests of the patient in mind. Design a system without dead-ends, thus keeping pathways open for upward and lateral mobility, ever keeping in mind that the abilities of individuals differ as do their aspirations. Make provisions for entrance at advanced levels, make provisions for the "super" technologist and consider him as one more extension of the radiologist. Consider carefully the advice of the professional educators, the manpower specialists and the administrators - even though not radiologists or radiologic technologists - they are all experts in their respective areas and can contribute invaluable assistance in attaining your goals. May your collective efforts exceed the sum of your individual contributions and lead toward your common goal - Better health care for patients through radiology.

First Plenary Session



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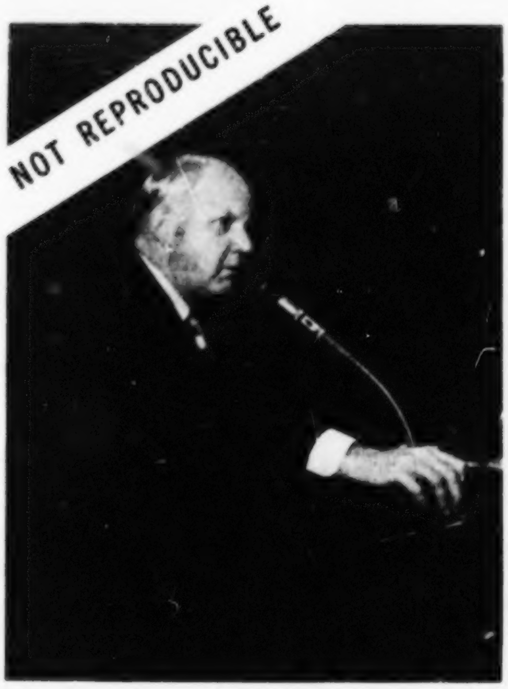

James Pat Steele, M.D.
Chairman, Commission on
Technologists Affairs
American College of Radiology

REVIEW OF ESTABLISHED SCHOOL ESSENTIALS

It is always a welcome opportunity to talk about the future of any effort. The interest of many people and many groups in helping those who have pioneered an effort is a necessary part of the transition from a struggle to a successful program. Thus, we can look ahead today. But in doing so, we do need to start by assessing the road we have traveled and by measuring our achievements against the needs of our people.

But first, let me digress for just a moment to note that a very large measure of credit for the base upon which we build today should be ascribed to Dr. Bradley Soule and to his devoted colleague, Ralph Bannister. You all know the numbers. About 100 schools in 1952 and no organized effort worthy of the name. And when Brad and Ralph surrendered their voluntary duties recently, we had more than 1200 schools, a going program and a measure of social concern that just did not exist 15 years earlier. We have places to go, but we have come a long way.

When doctors first began seeking help with their early x-ray apparatus, they mostly looked for people with some background which would allow them to handle the tubes and the plates. Since the doctor acquainted himself with x ray in a few hours, he saw no reason to spend weeks or months training an assistant. Such an attitude could not endure productively as radiology became a discipline. Soon the new specialist found that he was expected to show his helpers what was wanted of them. He found that they needed to know something of the same sciences which were basic to his own application of x rays. In those years, no one else knew or cared that the radiologist needed a helper with specialized training and aptitudes.

The radiologist's basic objective, then and now, was to find and prepare someone who could assist him in the diagnosis and treatment of patients, someone who could operate the increasingly complex gadgets, who could handle patients and who could ease the flow of work through the x-ray department.

These responsibilities which the radiologist expected of his technologist began to fall into several definable categories. There are specific ways in which the technologist assists the radiologist, such as in the performance of fluoroscopy or special procedures. There are the delegated tasks which the technologist carries out on his own initiative such as radiographic examinations. There are departmental responsibilities for day-to-day operations, scheduling, first echelon maintenance and even coffee making. There are the responsibilities for supervision of other technologists and personnel, for the teaching of technologists, for the exercise of radiation safety procedures. And, of course, there is the ongoing thread of good patient contact and relationships.

All in all, there was a need for a person of common sense and an increasing level of sophistication who could acquire the skills needed to function in the growingly complex x-ray departments and offices. At the same time, radiologists recognized the obvious facts that the circumstances of technology did not provide the same attractions and incentives that were his as a medical specialist.

Thus, formal training programs began to evolve as a way of making the necessary compromises through which adequate numbers of aspirants could be found, motivated and trained to assume careers in technology. The training still was aimed at producing a person who could work for and with a radiologist in a subordinate position.

We in radiology are very much indebted to many people who came into technology and stayed to make it a more useful and effective vocation for their successors. Some of these technologists deserve credit for motivating radiologists to organize and to allow the organization of training programs.

The evolution of the outlines, curricula and essentials by which our formal programs are guided have never been the arbitrary overview of the radiologist or the product of the benevolent despotism of the American Medical Association and its Council on Education. These programs and the codified essentials have resulted from the shared experience and the shared concern of radiologists and technologists.

Remember, too, that the interest of others---in the Public Health Service, in the community colleges, in other elements of medicine---all came later. Thus, the evolution of the essentials of training programs represented a pragmatic reaction to the problems of radiology. The hospital-based programs may not have been the optimum vehicle. But they were the only car on the road.

These technologist programs were training efforts, as distinguished from educational projects. They were terminal programs designed to create a single basic level of competence founded upon a presumption that the people entering the program would have a mutual philosophic commitment. Within these contexts, our hospital-based programs can be judged as successes for the most part.

There would be little point in my recitation with you of the points contained in the 1969 essentials, which you all have. There would be little excitement in tracing their technical evolution up to the current version. You can read more rapidly than I can speak. Besides, these essentials are subject to revision and improvement and I would defend their objectives, rather than their current form.

However, let me acknowledge that we have all tried to crowd more and more into the package. We have recognized that the revered basics most certainly can be taught better and more efficiently by teachers in good educational circumstances than they can by harried volunteers in spare moments in a hospital lounge. We have recognized that the high school graduates who opt for technology may not be mature persons capable of wise career choices and that their intellectual growth should be stimulated, rather than stymied, by our training programs. And we have recognized that there is a deplorably short yield in terms of work careers for many of the graduates of our technology programs. The women get married and the men look for better paying jobs in too many instances. Lest there be criticism from the women's liberation movement, let me assert that I much favor the opportunities for women to combine careers and marriage, rather than deploring the healthly biological distinctions between the sexes.

All of this is but to say that our approaches to new things in technology training must be built upon the pragmatic bases of our existing efforts. There is a need for didactic work in the sciences and practices underlying x-ray technology. There is the strong desire to utilize better educational techniques and facilities. There is the advantageousness of providing technologists with a broad educational base which is not a terminal experience. But there is also the primary and ongoing necessity of giving these people the skills and experience which is fundamental to their acceptance of the tasks of radiologic technologists. This can be achieved only through a reasonable, well-planned, supervised practical experience working with patients and equipment in the setting where x-ray services are provided.

Thus, we are fierce and intransigent in our affirmation of the practicum as a major portion of technologist training. We know that shortcuts in experience produce gaps in the competence of technologists to deal with patients and examinations, regardless of the excellence of didactic work. We know that the cumulative adaption of the student to hospital ways and to partnership in the functioning health care team must come in real-life situations.

Certainly, there is no moving hand which writ bold a God-given figure of necessary hours on the wall of the x-ray department. We would want people for special procedures to have many hours of experience, both generally and in those specialized ways. We could accept others with less than we need for well-rounded people. So we try to find a balance which is effective for our general run of generally qualified people. All of these decisions, these compromises of objectives with resources, are reflected in the essential by which we guide our course of instruction.

Except for the military programs which have their own priorities, we have felt that the optimum training program combines didactic work with practical experience. Medical education has come to the same conclusion, more belatedly. We think that didactic work has more meaning and less tedium if a student relates his lecture to yesterday's experience. We think that the real-life mixing and mingling is highly valuable, even if it is not so neat nor concise as a completely didactic package.

This is the logic and the philosophy behind the essentials of technology training as they have evolved to this point. This logic has not been challenged, in our view, by the continuing need to do more and better things about technologists. We are seeking ways to take advantage of the new methods, new people, new resources and new opportunities which now present themselves.

As we look just a bit into the future of radiology, we see that the demands upon radiologists and upon technologists will grow at a more rapid rate than they have grown to date. We see the introduction and acceptance of new instrumentalities, methods and technologies in the visual, non-destructive diagnosis of disease. We see the increases in radiologic techniques for treatment of diseases. And we know that the demands for numbers of technologists and for the quality of technologists must rise in future years. Thus, we seek to build on what we have done.

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Edmond P. Garvey, President
Springfield Technical
Community College

EDUCATIONAL SYSTEM RESTRAINTS

It is an honor and a privilege to have been invited to participate in this Conference and, hopefully, to help identify and resolve some of the constraints which deter Community College Presidents from establishing programs for training Radiologic Technologists. I hope that a review of our experiences will be of some benefit during your deliberations.

In the material handed out at the start of this meeting, you should find:

A college catalog,

Copy of the application submitted by Springfield Technical Community College to the Massachusetts Boards of Higher Education for permission to implement a program to train Radiologic Technologists,

Brief description and history of Springfield Technical Community College, (Handout A), and

Chronological listing of procedures which had to be followed prior to starting a program in Radiologic Technology (Handout B).

The strongest recommendation of the 1966 Conference was to establish more college-affiliated programs since the existing programs cannot meet the ever-increasing demands for Radiologic Technologists.

You are all aware of the phenomenal success of the Community College movement in this nation during the last decade. The growth has been far greater than any other segment of education. There are, at the present time, 1100 two-year colleges as compared with 656 a year ago. Enrollment has increased from 600,000 in 1960 to 2,000,000 in 1970 with 100 new colleges opening each year.

In view of the ever-increasing enrollment, it would seem likely that Community Colleges, particularly co-ed schools, would make an effort to meet the demands for Health Service personnel by instituting programs to relieve hospitals and patients from assuming this costly burden. Statistical information contained in a paper presented in Miami last year by Dr. C. Larry Crabtree of the Bureau of Radiologic Health revealed that this assumption was false. Dr. Crabtree pointed out that of the 1257 (now 1300) AMA approved schools of Radiologic Technology, only 200 are associated with academic institutions and only 48 schools grant the Associate in Science degree.

There are very logical reasons why private community colleges and State-supported community colleges located on rural campuses have not attempted to establish Health Programs. Private colleges are faced with far too many financial problems at the present time to consider adding new programs. Further, state-supported institutions located in rural areas cannot provide training due to lack of the required clinical facilities.

During this workshop, we must look for the reasons why State-supported community colleges on urban campuses fail to provide training for Health Service personnel. Many of my fellow presidents have indicated that they are reluctant to implement additional offerings not only because of the constraints which will be encountered but also because of the lack of specific information regarding the organization, administration, and operation of innovative programs. Further, restricted budgets make it impossible for colleges to do curriculum research even on a very limited scale. Our Springfield Technical Community College is more or less typical of the large urban-based community colleges in America, and our problems are similar.

Our administrative staff members are reluctant to add new courses knowing the constraints that must be resolved; namely, budgetary restrictions; the problem of approval by the State Board of Education; the inability to secure qualified staff members; lack of adequate facilities; and lack of experience in the innovative fields.

In the material handed out prior to this meeting, you were given a brief description and history of STCC (Handout A). Your attention is invited to the fact that on the favorable side, the college has had substantial experience in medical health service training; secondly, adequate clinical and classroom facilities were available; and lastly, the college had a source of qualified teaching personnel because two existing hospital-based Radiologic Programs were being phased out. This, no doubt, explains why STCC was not only willing but able to establish a program of Radiologic Technology.

In retrospect, I know that both time and effort could have been saved if a primer concerning the planning, organizing and operating of a college-affiliated programs in Radiologic Technology had been available. As a result of the efforts of the people attending this conference, a primer will be made available to schools planning to implement such a program in the future.

An outline of procedures followed and the actual constraints experienced in implementing a Radiologic Technology Program at STCC were included with the other handouts. Using this outline, I should now like to review with you some of the problems encountered. (Handout B).

HANDOUT A

Brief History and Description of the Springfield Technical Community College

A. History

1. Started as Springfield Technical Institute - 1950
2. Degree granting privileges - 1964
3. Jointly operated by State of Massachusetts and City of Springfield
4. Availability of new campus
5. Start of State Comprehensive Community College - 1967

B. Community Resources

1. Population - 500,000 in Hampden County
2. 19 Affiliated Hospitals
   3 local (fully accredited)
   1 federal, 2 State
   13 in surrounding communities

C. Faculty - 148, Students - 5000

D. Facilities - 55 acres with 30 buildings totalling one million square feet

E. Course Offerings

1. Transfer: Liberal Arts - Engineering - Business
2. Career: Technical - Business - Health Services
3. New: Bio Medical
4. Proposed: Nuclear Medical - Laser - Electro-Optical Technology

HANDOUT B

Constraints Experienced in Implementing a Program for Training Radiologic Technologists (STCC)

I. Planning Request

   A. Forward a planning request to the Massachusetts Board of Higher Education via the Massachusetts Board of Regional Community Colleges

   B. Information required with request: See below II B

II. Procedures to be Followed Contingent upon Approval by the Board of Higher Education to Proceed with Planning

   A. Selection of a local Advisory Committee

      1. Hospital Personnel
      2. School Faculty
      3. General Public

   B. Determine need for training program

      1. Local survey to determine placement opportunities for graduates
      2. Consult U. S. Department of Labor Occupational Handbook
      3. Existing training programs in Springfield area and/or regional planning
      4. Availability of clinical facilities
      5. Request from three hospitals for training program at STCC
      6. Investigate possibility of consolidating the three programs presently in operation

   C. Accreditation requirements

      1. A.M.A. requirements - Essentials of an Accredited Educational Program for Radiologic Technologists (Dr. Warren G. Ball, DDS)
      2. American College of Radiology requirements
      3. American Society of Radiologic Technologists
      4. Board of Education - General education subjects Minimum and maximum semester hour requirements for graduating
      5. Admission requirements
      6. Accreditation - New England Association of Colleges and Secondary Schools

    7. Library facilities

D. Curriculum Development

    1. Coordination of required 24 month schedule with existing 10 month school year
    2. Additional hours required for Registry Exam
    3. Textbook requirements

E. Personnel: Faculty

    1. Course Director - one for each hospital
    2. Availability of instructional staff
    3. Salary schedule
    4. Board of Community Colleges approval of faculty

F. Students

    1. Advance Publicity Program
    2. Admission requirements
        a. joint selection of students by hospitals and college
        b. Open enrollment policy
        c. Physical examinations
        d. Academic test results - (SAT) transcripts
    3. Recruitment - 12 months in advance of opening of school
    4. Public relations - Hospital Administrators and staff - Health Service Agencies

G. Implementation of Continuing Education program for non-degree Technologists

    1. Admission with advance standing

H. Facilities

    1. Capital equipment
        a. Budgetary requirements $18,033 for college laboratory demonstration equipment
        b. Availability - Pert Program
        c. Installation
        d. Clinical facilities
        e. Classrooms and demonstration laboratory
        f. Audio visual aids

III. Submission of Formal Request to the Massachusetts Board of Higher Education for Approval of Curriculum Proposal and Permission to Implement Program

A. Support documents

    1. Purpose - objectives - need
    2. Curriculum
    3. Budget
    4. Faculty qualifications for approval
    5. Starting date
    6. Enrollment projections
    7. Advisory committees
    8. Course descriptions

B. A.M.A. in collaboration with American College of Radiology and Council on Medical Education

C. Massachusetts Department of Public Safety - Massachusetts Department of Public Health Certificate

IV. Implementation of Admission Testing and Counseling Program for Prospective Students

V. Establish Contractual Agreement with Affiliated Hospitals

VI. Student Evaluation

VII. Submission of A.M.A. Application for Approval of a Community College Based Education Program in Radiological Technology

NOT REPRODUCIBLE

Joseph Kadish, Ed.D.*
Acting Chief, Educational Program
Development Branch
Division of Allied Health Manpower
Bureau of Health Manpower Education
National Institutes of Health
Public Health Service

PROGRAMS FOR ALLIED HEALTH CAREERS

The severe need for qualified allied health personnel has been identified, deplored and discussed on many occasions at national and community levels during 1970. As we approach 1971, the first year of the decade in which allied health workers are expected to increase from a little more than 1 million to nearly 2 million, it seems appropriate to look at the status of our efforts to increase the allied health manpower pool, and to identify some trends in ways to meet the manpower goals of 1980, that have implications for the field of radiologic technology.

The first legislation to target on the need for allied health personnel was the Allied Health Professions Personnel Training Act of 1966. The state of the Nation's economy since that time has made the early years of Federal support for improving and strengthening the educational opportunities for allied health manpower, years of struggling to make progress. In spite of, or perhaps because of, the struggle, there were some important achievements during those years. Among them were clear identification of a number of the basic issues underlying the reasons why there are not enough allied health personnel available to provide the health services that the public is demanding.

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*Delivered the speech prepared by Kenneth M. Endicott, M.D.
Assistant Surgeon General, Public Health Service
Director, Bureau of Health Manpower Education

Not the least of the maturing experiences we have had since 1966 was the development of the Report to the President and the Congress on what had been achieved under the initial allied health legislation and what were the education needs in the field. The Secretary submitted that report in April 1969. Just six weeks ago our agonizing over that report paid off significantly when the President signed the Health Training Improvement Act of 1970. That new allied health legislation includes provisions that will make it possible for the Federal Government to encourage and assist allied health professions educators, health manpower planners, administrators and practitioners to carry out activities that can make important breaks through barriers that are now inhibiting the growth, in numbers and quality, of allied health personnel. It will be possible for example to undertake activities related to equivalency and proficiency testing; new methods of recruitment, retraining and retention of allied health personnel, and the development of new kinds of relationships between health-service institutions and educational institutions. In summary, the new law authorized nine programs for the next 3 years, through June 30, 1973. They are:

> Construction grants for teaching facilities,
>
> Formula grants to training centers for allied health professions to improve and to strengthen allied health curricula. (These are the basic improvements grants as previously authorized),
>
> Special improvement grants to allied health professions training centers to provide, maintain, or improve their specialized training function,
>
> Special project grants to public or nonprofit private agencies, institutions, or organizations for training or retraining of allied health personnel. (Such projects may also be supported through contracts with individuals, agencies, institutions, or organizations.) Eligible projects include the following:
>
> a. Planning, establishing, or developing new programs; modifying or expanding existing programs, including interdisciplinary training programs.
> b. Developing or establishing special programs or adapting existing programs to reach special groups such as returning veterans with experience in a health field, the economically or culturally deprived, or persons reentering any of the allied health fields.

c. Developing, demonstrating, or evaluating new or improved teaching methods or curricula.
d. Developing, demonstrating, or establishing interrelationships among institutions that will facilitate the training, retraining, or utilization of allied health manpower.
e. Developing, demonstrating, or evaluating new types of health manpower.
f. Developing, demonstrating, or evaluating techniques for appropriate recognition -- that includes equivalency and proficiency testing mechanisms -- of previously acquired training or experience.
g. Developing, demonstrating, or evaluating new or improved means of recruitment, retraining, or retention of allied health manpower.

Grants and contracts to State or local educational agencies or other public or nonprofit agencies, institutions, and organizations for the following purposes:

a. Identifying individuals of financial, educational, or cultural need with a potential capacity for education or training in the allied health professions including armed service veterans.
b. Encouraging and assisting these individuals when appropriate to complete secondary school, to undertake essential postsecondary education that will qualify them for allied health training, and to undertake training in allied health curricula.
c. Publicizing existing sources of financial aid that is available to allied health students.

Traineeships for advanced training that will prepare teachers, administrators, supervisors, and non-research specialists in public or nonprofit agencies, institutions, and organizations, and

Scholarships, loans and work study programs for students who have exceptional financial need and who require financial aid to pursue an education.

I don't need to remind this group, however, that authorization Acts must be followed by equally specific appropriation enactments. In the current economic climate, I think it is very unlikely that appropriations will be forthcoming in the immediate future for construction and for student aid -- except, in the latter case, for advanced traineeships.

The outlook is not entirely bleak, however. The 1971 appropriations request contains comparatively significant increases over 1970 levels for advanced traineeships and the initiation of the new special project grants provisions.

Returning to the Health Training Improvement Act of 1970, I would like to call your attention to a requirement for two important studies. These are:

> Allied Health Study. The Secretary of Health, Education, and Welfare is required to conduct a study of allied health programs, including those covered by the Public Health Service Act and those administered by the Commissioner of Education, in order to determine their adequacy to meet the Nation's need for allied health professions personnel, and
>
> Licensure Report. The Secretary of Health, Education, and Welfare is required to prepare and submit to Congress, prior to July 1, 1971, a report identifying the major problems associated with licensure, certification, and other qualifications for practice or employment of health personnel (including group practice of health personnel) and recommendations for steps to be taken to solve them.

Our ultimate goal is to increase the pool of qualified allied health manpower. To that end we have already made some progress. The progress is, in fact, particularly significant in the radiologic technology field. Since the Allied Health programs were initiated student enrollments in the disciplines supported under the basic improvement grant program have nearly doubled and the number of programs offered have increased from less than 400 in 1967 to more than 700 in 1970.

The number of associate-degree level and baccalaureate level programs supported in the radiology field has increased from 18 in 1967 to 55 in 1970, the associate degree level experiencing the most rapid growth. It is to the credit of the profession that such strides have been made in this short time to strengthen training opportunities for radiologic personnel by the development of close inter-relationships between hospitals, the traditional source for this training, and educational institutions, the newer partner in the education of allied health personnel.

One of the most important programs that was authorized under the original Allied Health legislation provided support for the training of teachers, administrators, supervisors and other specialists for the allied health field. Under that program more than 1300 trainees have received assistance and either are, or soon will be, qualified for employment in leadership positions.

In the immediate years ahead special attention must be directed to preparing faculty, competent to transmit to students the accelerating developments that exist in all aspects of the delivery of health services. Preparation of such faculty has the highest priority of the health manpower bureau; and it is my hope that it will be yours.

The need for attention to this aspect of education and the radiology field is most acute. For the last two years there have been no awards made for advanced training in radiologic technology under the Allied Health Program. The energy the profession has exhibited in the development of training programs to prepare personnel for occupations in radiologic technology rather than just jobs subject to change from location to location, now should be extended to developing training programs to prepare educational and other leadership personnel in the field.

Another area that deserves priority in the radiologic technology field is the development and strengthening of interrelationships and cooperative planning among educational institutions and health-service programs. Some progress has been made in this area as evidenced by the growth in the number of programs in the radiology field that have become eligible for allied health educational improvement grants over the last four years. This is, however, only a beginning. Now is the time to further such relationships in this field. It is through these linkages that we can strive to improve the skills and judgment of all health personnel. We can also provide vertical mobility of these workers. Continuing opportunity is an essential component of high motivation and dedication to health careers.

In this same context I would urge that every effort be made also, to make these interrelationships and cooperative efforts apply to other disciplines, in order that appropriate horizontal bridges can be built and the most economical use can be made of scarce educational resources.

People learn in a variety of settings. We know that learning is not limited to the classroom or the laboratory. This is especially true in the health occupations. In the allied health field, in general, we need to examine whether knowledge required in non-traditional settings is equivalent to that learned in a formal academic program. There is a need for equivalency and proficiency examinations for the allied health occupations. The need is based on the premises that 1) students should not be required to repeat work that they have already mastered; 2) the objectives of college course-work can be achieved in other than classroom settings; 3) the acquisition of knowledge and skills can be measured by examination; 4) the results of these examinations can be used by colleges to determine whether advanced placement or academic credit should be awarded for previous learning and experience. Thus, equivalency and proficiency examinations have far-reaching implications for health manpower shortages and for career mobility.

Radiologic technology leaders need to examine how these concepts can be implemented to benefit the patient, the technician and the employer.

Finally, I would make a plea for real leadership in the field of radiologic technology to concentrate efforts on activities which will make the greatest contribution toward maintaining or increasing the output of personnel to provide radiologic services to people who need them. Decisions about who should be trained and how they should be trained must be based on answers to such questions as: How can we change existing training patterns to concentrate resources and increase the manpower output? How can we involve the socially and economically disadvantaged? How can we prepare radiologic personnel to more readily adapt to changing health needs? What do we know about where and in what capacities these personnel will be employed after they are trained? The answers to these questions must be developed by the community as a whole, rather than a single hospital or a single college.

In the decade ahead, the demands to increase the supply of qualified health manpower will require cooperation of the highest order among the various groups and institutions interested in the training and increasing effectiveness of all health personnel. The time has come for an interface among all interests in the health sector of our society. It must be candid. It must be professional and without pettiness. It must be motivated by an honest desire and intention to take action that will result in dynamic, yet orderly progress toward meeting the Nation's health manpower needs.

The results of this conference could be a significant step in this direction for radiologic technology.

NOT REPRODUCIBLE

Robert Coyle, R.T.
Director of Education
American Society of Radiologic
Technologists

PRESENT ASSOCIATE DEGREE TRAINING PROGRAMS

My purpose during this session is to present the current status of associate degree programs in radiologic technology. Since the working groups of this conference will be discussing four aspects of college program operation, I have decided to break this presentation into the same subjects.

Detailed, accurate information about college affiliated programs is presently scarce because these programs are developing quite rapidly. Most new programs appear to be replacing existing hospital based schools; others are starting new programs altogether. Many of these programs do not file applications for AMA accreditation until they have been in operation for over a year. This fact along with some basic confusion about the identity of college affiliated programs does not make the job of keeping track of them easy.

For all of the variations in the structure of associate degree programs, two basic patterns of administration can be identified. The first arrangement can be described as a 24 month, hospital based program affiliated with a community college. Recruitment, screening, selection of students, delivery of the instruction, provision for instructional staff and the program and activities of the student all remain vested within the health care facility, specifically the department of radiology. Somehow agreement is reached on the subjects to be offered by the college and a mechanism for awarding credit for courses from both institutions for the associate degree.

Programs of this type can be found in older colleges who do not have the room or the resources to establish on campus facilities or provide instructors. This type of program also appears where new community colleges combine with hospital based schools already existing in the area.

The second type of program is typical of those colleges which establish large, complex Allied Health Divisions. It is more characteristic of the newer community colleges now that the entire system is more experienced in the administration of allied health programs. The control, which rests within the educational institution, is the central feature of this type of administration. Recruitment, screening selection of students, the delivery of the instruction are all based on the campus. The college provides a technologist-director and perhaps a corps of clinical instructors. The personnel of the health care facility function in advisory capacity sometimes with strength, sometimes weakly.

There are arguments for and against either of these arrangements. Those in favor of hospital control want the selection of students and delivery of the curriculum to take place in a patient oriented environment and be done by patient oriented personnel. Those who favor college control frequently refer to the economic orientation of the hospital based program and the back seat education must take to the function of the department.

One common denominator exists for both types of programs and that is the department of radiology. If the personnel of that department are not satisfied with the associate degree program they can take one of three courses of action: try to change it, try to take it over, or pull out. Needless to say, the department of radiology is vital to the associate degree program in radiologic technology. Frequently formal agreements are desired or required to delineate responsibilities, procedures and the chain of command. Perhaps careful planning of these agreements, rather than just writing them, might solve some of the administrative problems.

The curricula in community college affiliated programs is as varied as there are communities. Strict regulation is resented in this area. Guidelines are also resented if they have "shalls" instead of "shoulds" in their wording. The resource packets previously mailed to the conference participants contained two documents, one dated 1968 and titled "Guidelines for Junior College Affiliated Education Programs in Radiologic Technology". The other document is dated October, 1970 and titled "Organizational Guide for Associate Degree Programs in Radiologic Technology". This latest document has not yet been put into use. You are all perfectly capable of comparing and recognizing the changes in the documents. For those of you who are not familiar with it, don't get your hopes up if you expect it to result in significantly shorter programs. The subject of program length and hours is going to receive a lot of discussion at this conference. It will serve my purpose to point out the objective this profession had for the community college program. In 1966, when the first guidelines were written, it was stated that hopefully the graduate would be one capable of developing into the supervisory or teaching technologist urgently needed. To accomplish this, those guidelines added traditional college-level subjects to the base curriculum - and the only curriculum - for radiologic technologists. The only change made in the standards existing at that time was to reduce, by 1200 hours, the required clinical experience. This reduction was made in exchange for general education courses transferable to the baccalaureate degree.

The early community college guidelines designed a radiologic technology program which would provide graduates who could advance to the baccalaureate degree, if they wanted to, in a reasonable period of time. If the graduates did not want to go on for a higher degree, they could enter employment, eligible for registration by the American Registry of Radiologic Technologists and meeting the current voluntary standards for employment. Everyone here knows the curriculum took longer than two years. Some programs took 33-36 months to complete. Radiologic technology stood out like a sore thumb. Other allied health professions had a category of worker or created one according to their needs which could be educated in that tidy two-year period of time. Radiologic technology did not and it has not created a new category of worker.

The effect of associate degree programs in radiologic technology on manpower is not known at this time. Only the individuals from each program know how their students compare with students educated in hospital based programs. Currently, associate degree programs are set up without careful study of: the population, employment opportunities, needs created by future population growth, existing programs it will replace or compete with, the human resources available in the community, and what areas most need radiologic technologists and would most benefit from their availability and employment. No program, no matter where it is based, can aid solution of manpower problems unless it thoughtfully addresses those points.

External influences on associate degree programs change by the year or the political party in power. Legislation supporting allied health programs can both help some associate degree programs and hinder others. State laws for the licensing of technologists can aid the establishment of associate degree programs or it could necessitate their establishment.

The American Society of Radiologic Technologists, the American College of Radiology, the Association of Schools of Allied Health

Professions, the American Association of Junior Colleges, the Bureau of Radiological Health and the American Medical Association are some of the many prominent external influences on current associate degree programs in radiologic technology. At least there are more agencies concerned with education in radiologic technology now than there were when the hospital school was the sole source of registered radiologic technologists.

Current associate degree programs have not been studied to answer the following questions. After the bright new on-campus laboratory was complete and in use for the education of the students, did it really improve their education? If it did, why? If not, why not? Now, after a number of years of operation, is there really a financial benefit for the hospital and patient by discontinuing hospital based programs in favor of college based programs? Or, are we still assuming there is? Have we used the remedial courses and the developmental learning laboratories available in colleges to our best advantage? Have we used the innovative and enthusiastic attitudes and philosophies of community colleges to our advantage?

All of these questions concern issues which were spoken of as favorable toward the establishment of associate degree programs in all of the allied health professions.

If there is something to be learned by answering these questions, I suggest it would be well to find out what it is. If these answers point the way to new objectives, I would also suggest that the research to justify them be started. If technology is to be looked down upon for what some call the upholding of unreal objectives to guard our ranks, then any new objectives which might be developed as a result of this conference, or in the future, must be carefully researched and validated on the basis of their true effect on patient care and the economic and efficient use of personnel in a real radiology department.

NOT REPRODUCIBLE

Carol Kahler, Ph.D.
Professor and Chairman
Division of Instruction
St. Louis University

IMPLEMENTING PROGRAMS

This afternoon I have decided to play my role as directly and realistic as possible. Perhaps as the fifth speaker at this plenary session, I can be forgiven. It should also be noted that my presentation is a warm-up to the conference "challenge" and will be followed in short order by a period of "attitude adjustment." All of these factors gave me courage.

You are entering a new phase of concern. You have built programs to train radiologic technologists before. You have been concerned with quality before -- that is not new. What is new is the involvement of another professional group. For better or for worse, radiologic technology programs are currently being tied to community junior colleges, whose administrators have most often been professionalized in schools and departments of education across the country.

The addition of any new group to a cooperative enterprise means that group has been given a stake in the success of the joint project. The experience of industry, as well as the experience of previous health groups, indicates that the addition of a new professional group with a stake in educational preparation means more than slicing off a bit of the domain of former partners and handing that portion of the pie to the new group member -- instead, it calls for a realignment of the total task, a reconsideration of the thing each group prizes most as its professional requirement. What will each of you, in the name of your professional group, demand? What will each of you give up? I am going to have the audacity to forecast your demands and your negotiable interests. You need no reassurance that I speak without power and without influence, even though I am a long way away from home. But in case you have forgotten the Chairman's introduction, let me repeat that my primary professional affiliation is in the area of curriculum, as a part of a teacher education endeavor of a large university. Because for so long St. Louis University had the only four-year program in radiologic technology, I should clarify that my connection with that program has been purely incidental--through a personal admiration society for Sister Mary Alacoque and through knowing graduates from that four-year program who pursued advanced degrees in our department over the last fifteen year period. While I was project director for the original guidelines group for health technology programs, one look at the committee names will convince you that my most appropriate role was as an astute observer who occasionally played at peace-making or war-starting in order to keep things moving.

This was also true as I edited the guide for medical laboratory technician programs and is still true of my current extra-curricular involvement with members of the Commission on Medical Emergencies of the AMA and a number of junior college representatives who are meeting to build guidelines for medical emergency technician programs. Since all of the projects involved junior colleges, let me begin with my predictions about the junior colleges, what they will insist upon and what may be for negotiation. My concern as a curriculum person is that each group puts into an educational program that which it can do best.

What can the junior college do best?

The college is probably best at being responsible for the entire educational program, but it can negotiate the manner in which it exercises its control--coordination of delegated tasks can be an acceptable way of exercising the college's responsibility.

As the degree granting institution, the college is "responsible" and must remain responsible for the ultimate decision that all requirements for successful completion of the degree programs have been met; however, it can also rely upon the radiologist and the radiological technologist to judge whether or not the student is competent to practice.

What can the radiologist do best?

If you want radiologists to contribute most to sound programs, what may be insisted upon and what may be up for negotiation? I am viewing radiologists both as employers and as knowledgeable medical specialists. Therefore, they may insist upon control of such decisions as "how many learners can be accommodated at one time by the personnel and facilities which they keep operational?", and they may insist upon remaining the final arbiters of the student's competency.

These two demands appear not only reasonable but necessary. However, there is nothing in these two demands to preclude radiologist consultation with technologists in deciding about student competency--this again would seem reasonable and necessary; but these two demands do not include the necessity of naming a radiologist as program director. As a matter of fact, when college programs attract larger groups of students, a single program would depend upon the x-ray facilities of a variety of hospitals, making it necessary for a full-time college program director, perhaps a technologist, to act as coordinator of all field placements.

What can the radiologic technologist do best?

The technologist with an interest in education and credentials for junior college teaching will perhaps contend that he is the best prepared to be the director of the program. If so, I happen to believe that he should be a full-time faculty member of the college. The program director is the "swing" person translating college to medical world and vice versa as the educational program is planned and implemented, with hospital experience appropriate to competencies demanded. But whether or not the program director is a radiologic technologist, it is clear that the experienced technologists will be sought after as teachers of students in the community college programs -- either on the college campus or in the off-campus x-ray facility. The radiologic technologist needs sufficient contact with students of the field to become the "model" so desperately needed in every professional enterprise. This is probably the radiologic technologist's basic demand.

This does not mean, however, that contact needs to take place in a specific setting or for a prescribed number of hours. Never yet has it been demonstrated that length of contact had much to do with its intensity, its identification power, or its probably emulative effectiveness except under the most controlling conditions with infants and the very young -- even among them, one observes reversals in behavior. Thus, the place, type and amount of contact to produce identification with the profession is, or should be, in my opinion, negotiable.

What can the health agency administrator do best?

Health agency administrators will need to cooperate also. To insure this, they have most often asked for a hand in developing, with radiologists and radiologic technologists, illustrative job descriptions and specifications so that they can have reasonable expectations of program graduates and knowledgeably perform their long-range personnel planning. Most other connections with the program are, in my opinion, negotiable with the health agency administrator.

What can the Government do best?

The public, through government, will make insistent demands for safe practice assurances, while a parallel demand will be for a sufficient number of personnel trained to provide the service needed. These two demands are essentially non-negotiable, while this group remains open to negotiation on most other matters concerning the preparation of radiologic technologists.

Domain consensus.

The insisting and giving up I have been talking about -- the things I have been predicting are those trade-offs which I see as necessary to reach domain consensus. You may feel that we should all remain polite souls and not insist upon anything as crass as trading power in some things for power in other things. My support comes from some social psychologists like Ruth Coser who would urge open consideration of conflicting interests as a growth process; other support comes from the philosophy of the National Training Laboratory in Group Dynamics (known as the Bethel, Maine group) which, by my interpretation, urges the courage to recognize one's own self-interest as a basis for achieving, eventually, a greater common good. From the organization theorist's point of view, you might wish to consult James Thompson's book, Organization in Action, wherein he reviews the many situations in which it is necessary to achieve domain consensus rather than to sketch one's operating sphere through unilateral action.

As you struggle over this matter of domain, know that you have entered the mainstream of education. Perhaps you have seen reports of the Texarkana, Arkansas experiment with the public school purchase of instruction on a contract basis from private organizations. With public school boards (notice that was plural) essentially establishing a competing school system within their domain by turning over the operation of elementary schools to the Behavioral Research Laboratories, it is clear that radiology is not the only field which needs to direct its attention to "domain." We need not even whisper the term "Free Universities," those things which are growing up on most campusus in one form or another. But where there are common projects to be pursued by groups who have an interest in the same ultimate goal -- as is true even on University campuses today -- the initial step toward implementation of any program is the course you are pursuing at this conference: frank discussion of the stake of each group, recognition that some factors are most important to some groups and cannot be compromised while other factors are open to negotiation.

A second means of implementation of the educational programs you seek to establish in increasing number in junior community colleges is one that is becoming important in all of education under the term "accountability." Accountability asks the question, "when we finish, will we have people who can do the job?" So long as we, in our educational endeavors, are satisfied with large, generalized goals to which few evaluative measures can be applied, there can be only vague determination of whether or not a given program has been successful, and student failure on registry examinations and in later work situations is seldom pinpointed to weaknesses in the educational program. Standards are not standards when they refer only to hours spent in a setting rather than to marks of competency or measures of efficiency in the performance of tasks; the enumeration of the kind and quality of performance which is adequate is difficult; all standard setting is difficult.

There is too much evidence of individual differences in the development of competencies to ever again put faith in time-locked educational experiences. Benjamin Bloom and his staff at University of Chicago are making the assertion--on the basis of their own work, that of John Carroll, R. C. Atkinson, R. Glaser, that "given sufficient time, 95 percent of students can learn a subject up to a high level of mastery. We are convinced that the grade of A as an index of mastery of a subject can, under appropriate conditions, be achieved by up to 95 percent of the students in a class." But "mastery" will occur at very different times for each student--and only if each is led to the type of help appropriate for him. (different types and qualities of instruction.) Colleges are beginning to recognize this through extended-time programs, particularly for students from disadvantaged neighborhoods and inner-city high schools who may not have desired pre-requisites. Thus, 2400 patient-contact hours (or even 1500 or 3600) is not cued to the concept of accountability; accountability also precludes using that gross term "didactic instruction" and points to replacing it with the elements of instruction: demonstration, observation, theoretical derivation of procedures, practice of techniques, explanation of procedures, etc. So too, the terms "clinical instruction" and "patient-contact hours" are gross and deceptive, making mockery of any real attempts at accountability; for certainly these terms above all others have "lumped" the true variety of experience which must be practiced and perfected under competent supervision. When we really seek to educate, it's not a matter of putting in time--whether that time be counted by clock hours or by semester hours. Curriculum building and implementation is a matter of defining competencies in students, allowing varied times in order for students to develop competencies within given speed and accuracy ranges.

In the context of competencies, we may still do a poor job of accounting for the student use of inputs--but at least there is a beginning.

It is interesting to note that the 1969 "Essentials" more consistently open the door to this type of thinking than do the 1968 guidelines for junior college affiliated programs. The published glossary of terms to be used with job descriptions in the radiologic technology field is another giant step in the direction I have been indicating.

Like all of education today, the field of radiologic technology is taking a fresh look at the means employed to reach defined goals. In higher education we are, as perhaps has been aired too publicly, questioning even some traditional goals. Your new partner is not "staid," "settled," nor do many community colleges have a tradition as long as the tradition of your field. But your new partner has "appeal" to the young people you need to attract to radiologic technology. Your field is a personal service vocation which potentially has great meaning to young people of today. Colleges need to offer programs in this field; radiologic technology needs to have them do it. With stakes like these; with a conference like this, a forecast of success is certainly warranted.

SUGGESTED REFERENCES

Atkinson, R. C., Computerized Instruction and the Learning Process. Technical Report #122, Stanford, California. Institute for Mathematical Studies in the Social Sciences, 1967.

Bloom, Benjamin S., "Learning for Mastery" from Evaluation Comment, Center for Study of Evaluation of Instructional Programs, 145 Moore Hall, University of California, Los Angeles: Los Angeles, California 90024. Chapter in Formative and Summative Evaluation of Student Learning. McGraw Hill

Carroll, John, "A Model of School Learning." Teachers College Record, 1963; 64:723-733.

Glaser, R. "Adapting Curriculum to Individual Performance." Proceedings of the 1967 Invitational Conference on Testing Problems, Princeton, New Jersey: Educational Testing Service, 1968.

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Glaser, R. "Adapting Curriculum to Individual Performance." Proceedings of the 1967 Invitational Conference on Testing Problems, Princeton, New Jersey: Educational Testing Service, 1968.

recruitment, including entrance requirements, student counseling needs, student support and numbers of needed programs.

Group 4 on External Influences, in dealing with such factors as accreditation of the programs, certification of the students, existing State laws and government regulations, professional and community attitudes and opinions, and the employability prospects of the students and graduates, will consider the contributions and guidelines available from all sources.

Finally, we are all charged with participating fully in the Conference summing-up process which we hope will result in a summary of what you feel are the best approaches to resolve the problems that must be faced in establishing and operating college-affiliated programs in radiologic technology.

Workshop Sessions

- CURRICULUM WORKSHOP
- ADMINISTRATION WORKSHOP
- MANPOWER WORKSHOP
- EXTERNAL INFLUENCES WORKSHOP

CURRICULUM WORKSHOP

Curriculum related to the didactic work provided by the college and the practicum offered by the affiliating hospital or hospitals.

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CURRICULUM WORKSHOP

Workshop Moderator: . . . . .Ehat, Donald, President
Organizational Development Associates

Overview Speaker: . . . . .Husted, Frank L., Ed.D., Dean
College of Allied Health Professions
Temple University

Reactors: . . . . .Lester, Richard G., M.D.
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Koppang, P. G., R.T., Supervisor
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Special Resource Speakers: . . . . Zembrod, Anton, CMSgt., USAF, R.T.
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Other Workshop Participants:

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Mrs. Betty Crofts
Dr. C. Dennis Fink
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Dr. Joseph Kadish
Dr. Carol Kahler
Miss Phyllis McEnerney
Dr. H. A. Mueller
Mr. Richard Olden
Dr. Roger Ozaki
Miss Muriel Ratner
Mr. Gordon Smith
Mr. Thorvold Sorenson
Miss Marjorie Stone
Mr. Richard VanTuinen
Mr. Roy Yokote

LEADERS, NOT LEANERS

Overview Speaker: Frank L. Husted, Ed.D.
Dean, College of Allied Health Professions
Temple University

Your program chairman has wisely allotted me forty minutes in which to set the tone and define the parameters of this workshop on curriculum. I can best do this by sharing two critical reactions. One: I would like to take less than twenty minutes; and two: I would like to talk more about the "Learning environment" than the restrictive concept of "curriculum." In so doing, I will have, I trust, satisfied your wishes for a short-winded tone-setter, helped the chairman maintain his time-table, and helped myself to a more exciting area of discourse. I would like to share some thoughts on the total learning environment and thereby set the stage for an expanded view of curriculum since it is a given premise that more happens to the learner (and to the teacher) than that which is traditionally conjured up by the single word "curriculum." If you doubt the validity of this premise, I invite you to walk into any clinic or academic setting in which it is offered and ask about the curriculum in radiological technology. I can guarantee that your host will produce a catalog, brochure, mimeographed notes or a verbal description of days, weeks, hours, courses, subject areas, audio-visuals and simulators all beautifully packaged in a terribly rigid and immutable format of lectures, seminars, directed experiences, assignments and examinations--"This," he will say, "is our curriculum in radiologic technology." He is correct; he is an honorable man; but that which he gives you is only part of the story--the static part. Get him talking about the process, the people, the problems, and the rewards and you will begin to get pieces of the total learning environment. Get him talking about the objectives, the criteria, the assessment mechanisms and, if you haven't scared hell out of him, you will get more of the total learning environment. Having gone this far you might as well go the eleventh mile and encourage his elaboration of the self-concept, role concept, which his program hopes each student will develop as part of the total process. These are the key pieces in the learning environment.

In addition to the discourse on an expanded concept of curriculum, I would also include an historical perspective re allied health professionals and a projection of the educational matrices and expanding roles of the allied health professionals in the delivery of health care.

I suppose it would be sheer heresy for an educator to suggest that the existence of a curriculum is a clinical sign of that academic disease known as "hardening of the categories." A more precise statement might well be akin to the erroneous abbreviation of a biblical adage which states that "Money is the root of all evil." The actual statement is that "The love of money is the root of all evil." Just so, in stating the obvious negatives of any existing curriculum, of structure, I might better suggest that the negatives are really found in over utilization of structure . . . in the love of structure, rather than in structure, per se. Some have journeyed far, and wisely so, in academia, from the days of a rigid, lock-step curriculum to the more exciting vistas of the flexible teaching-learning environments; from the frocked professor of the absent-mind, and the dog-eared, unaltered notes to the academician who is alerted to the need for relevance; from the schoolmaster who used the curriculum as a vehicle to get from "A" to "Z" to the master teacher who periodically stops the curricular vehicle to examine the relevance of the intellectual and professional scenery through which the team of teacher and learner are passing to get to the exciting objectives previously delineated and shared. Not all have reached this academic ideal. Those who have, cannot wait for those who will not.

In health education, we have moved far from the period of exclusive emphasis on O.J.T. in hospitals, private practitioners, and clinics. These programs led the student to the fence which enclosed the promised land of professional status and direct patient care but through which he could not pass. Some have moved beyond the time and place of secondary or tertiary importance in educational systems which emphasized a single professional entity. Each of these growth experiences was necessary and each of them required the peculiarities of a rigid, narrowly defined curriculum. The present trend looks back to take the best of these and to fashion a learning environment which takes all there is to gain from each daily experience, savoring it as one savors a rare wine and, having drained the cup, moves ever closer to the desired goal.

The growth of allied health programs in community colleges, senior colleges, and universities in a few short years has been nothing short of phenomenal. Baccalaureate programs, associate degree programs, and certificate programs in allied health have become a reality in hundreds of academic settings throughout the nation. Never before has the national academic scene been so involved in responding to publicized national needs. The social genesis of this ground swell for more health workers can be found in the position assumed by such national health leaders as Marty Switzer, John Knowles, Roger Egebert, Elliott Richardson and scores of others who view good health care as one of the several inalienable rights of every individual. A second critical vector in this move is the frank recognition by these and other health care leaders that adequate health care is not available to all and that the over worked solution of "more physicians" is really based on the false equation that "more physicians = better health care." One cannot argue with the basic premise that more physicians are needed, neither can one argue with the basic position that an expansion of the role of allied health professionals would result in the need for a lower physician: population ratio than is now assumed to be minimal to meet increased demands for health services. A third motivating, enabling force is found in Public Law 89-751, the Allied Health Professions Act of 1966. This act, which established the Basic Improvement Grants, has provided seed money, developmental money, to institutions responding to this manpower need.

If you as health professionals and health educators accept the challenge inherent in the expanded role of the allied health professional, then this acceptance must be reflected in the structure, process and product of the teaching-learning environment which you provide. You can no longer concentrate only on the content, the knowledge and skills, which have traditionally received the highest priority in most curriculum designs. Careful attention must be paid to the providing of opportunities for the student to develop positive attitudes, healthy self-concepts, strong egos and a firm conviction of his ability to contribute meaningfully to the health care team. It would seem that we are urged to enter a "team era" of patient care. In this regard, I insist that the educational atmosphere must instill the conviction that, as a practicing professional, the allied health worker is a vital part of that concept. There are those who believe that the allied health professional is but an appendage to it. The critical dimension is a learned one. We can educate the allied health worker to have the self-concept of an ancillary, an appendage, a paramedical--or--we can inculcate a firm conviction that effective service follows naturally from a self-concept of a fully qualified bonafide first class professional; one who brings to the patient care scene a unique set of skills, a unique body of knowledge. The challenge of the curriculum, then, is one of relevance, rationality and responsibility. In radiological technology, the task is yours. You can and must start today, with this workshop, to build in those features which will develop leaders, not leaners, and which will, in measured step, move each day toward that most desired goal of better and equal health care for all.

Reactor: Richard G. Lester, M.D., Professor and Chairman
Department of Radiology, Duke University Medical Center

Dr. Husted accomplished two important tasks in his introductory remarks. Firstly, he reminded us what every educational apparatus does or should do in terms of specific objectives and plans. Secondly, he directed our attention to what I conceive of as the real challenge, the question "Where Are We Going?" I might add the questions, "Why Are We Going There," "How Are We Going to Get There," and "How Are We Going to Know If We Are There When We Do Get There?"

By way of personal introduction you know I am a radiologist and have been involved in medical school and post-graduate medical education for some 17 years. Over much of this period of time, I have also been involved in allied health education. These experiences have included education of x-ray technicians, more recent and more broadly founded radiologic technologists and in experimental programs involving the utilization of allied health personnel in a variety of tasks that are traditionally in the province of physicians themselves. What I am going to say represents my own point of view. Much of what I say may be provocative, but perhaps that is the purpose of a reactor.

During the discussions yesterday, there were several points that appeared to me to be essential to the furtherance of our conference. Dr. Kahler made two critical points in her excellent presentation. The first related to a systems analysis description of what really happens when people get together and talk about a process that is itself in the process of changing. She pointed out that in order to come to any conclusion it is necessary to recognize what the needs are, what factors are negotiable and what factors are non-negotiable and then to come to some kind of snythesis, Having made this broad philosophic point (a point made by a nineteenth century philosopher with a rather extraordinary effect on history), Dr. Kahler went on to another more specific point about the educational process for medical and allied health education. She pointed out too that many of us have been addressing ourselves to the process as an end in itself, to hours, to devices, to methods, rather than to the real issue, namely, standards of competency. This is an essential point, however, if one is going to have standards of competency, one needs to have some concept of what one is trying to achieve, what kinds of competency, length of time during which competency must be maintained, etc.

Mr. Coyle also made vital points during the discussion yesterday. He discussed the purposes of college level radiologic technology programs and where they differ, or ought to differ in his estimation, from hospital based programs. He pointed out that the college level programs should be involved in the process of creating supervisory and teaching technologists rather than minimally competent technologists. What's more, it seems to me, better educational programs should create more interesting, more broad, more adventuresome, more humane technologists capable of performing duties that technologists were not prepared to assume in previous years.

Having said all of this by way of preamble, my own reaction as to what's been going on in the past years has been an increasing sense of unease about where we actually are tending with some (though by all means all) of the programs based in colleges and junior colleges.

Arve Dahl's *paper addressed itself to these matters. He stated that the training must assure that they either meet or exceed minimal standards of proficiency and knowledge in the use of radiation. I propose several questions in regard to this statement. Are "minimal" standards enough for programs that propose to improve the educational process for radiologic technologists. Are proficiency and knowledge themselves enough? In this regard, Dr. Husted's use of the "AKS" (attitudes, knowledge, skills) implies that the latter two by themselves are not sufficient. What's more, I think the "A" in "AKS" means not only the attitude with which one approaches today's tasks but also the attitudes that enable one to progressively increase knowledge and skills beyond the level of the end of the formal educational process.

Radiologic technologists are skilled, in the most broad sense, in the area of ministering to the sick and in the preservation of health in a specialized way. This aim is every bit as important for technologists as it is for physicians. I suggest to you that today's knowledge and skills are not enough for professionals in radiologic technology. The technologist must learn how to administer to the ill. I believe that today's attitudes and knowledge and skills are not enough in a system that is as dynamic and changing as is medical care in this country and around the world. We must teach our students not only to look forward to the day they graduate but also to how the graduate will attain the knowledge and skills and attitudes that will be needed two, five, ten, twenty years from today. The background necessary for this forward momentum should be a critical aim of the educational process itself, in my estimation.

In his paper, Mr. Dahl indicated that "There is also a pressing need for professional workers." We need technologists with

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*Proposed National Conference on Junior College Affiliated Educational Programs in Radiologic Technology. Radiologic Tec-nology, Vol. 42: 5-11, No, 4, 1971 advanced scientific and engineering skills, with sufficient background to allow them to assume additional professional status beyond current demands. We need technologists with additional administrator's skills. We need technologists with educational skills. We need technologists to perform functions that physicians are now forced to accomplish. I would suggest to you that in designing curricula it is essential that you at least begin to consider these matters. I would suggest to you that some of the leadership in creating this new breed of technologists should be coming from the technology schools themselves. I would suggest to you that to this date this leadership has come almost exclusively from physicians and scientists, and that the schools of radiologic technology have not addressed themselves to this.

There are indeed a variety of experiments in the utilization of technological personnel in new and more advanced functions. The program at the University of Cincinnati to train technologist administrators is one. The program at Duke to train physicians' assistants in radiology is another. The program at the University of Kentucky has similar aims. More and perhaps more clearly conceived experiments in radiologic education are needed. It seems to me that the technology educations ought themselves to be a part of this process of experimentation and innovation.

Mr. Dahl also discussed in his paper some of the reasons for the shift towards college based programs in radiologic technology. He pointed first to the soaring costs of hospital patient care and current questions of the validity of including hospital based training in the cost of hospitalization. The notion that student technicians reduce the cost of hospitalization is clearly incorrect and unacceptable. Any careful cost accounting indicates that a properly functioning hospital based program is additive in cost. Secondly, he points out that the present government policy provides funding and support to academic institutions only. At the present time, it is not possible to obtain support for hospital based programs. So, clearly, a second reason is governmental economic pressure to do what we are now in the process of doing.

These two reasons are quite germane, but nowhere is there any mention to what would seem to me the most logical reason for college level programs in the area of allied health. College level programs ought to be better programs. If the aim is simply to produce allied health personnel with the same knowledge, the same skills and the same attitudes as hospital based programs, one is simply dealing with a manipulation of funding mechanisms rather than addressing the real problems of the future of medical care itself.

I should like to turn now to what clearly is going to be a major item of discussion at this meeting, namely, the matter of the "2400 hour practicum." Yesterday's vigorous discussion makes clear that, despite philosophy and idealism, despite the needs of science and the practice of medicine, the practicum will be a major subject of discussion at this meeting.

Why 2400 hours? Clearly, this time has been established as an average or mean of the time needed - in the estimate of teachers of radiologic technology - to teach those attitudes, areas of knowledge and skills necessary to meet the minimal standards for a graduate technologist. This estimate has not been made on the basis of a theoretical construct or scientific investigation, but rather on the basis of history. It is then an estimate, not a fact. It is however an estimate based on the attitudes, knowledge and skills of those who teach radiologic technology.

There are three possibilities in regard to this estimate of time. The first is that there is too much practicum. This is a proposal attracted to those that are trying to fit an experience sufficient for student radiologists into a curriculum with other time constraints. Perhaps these educators are right. In view of yesterday's discussion, however, I think it should be emphasized here that the purpose of the practicum is not one solely of teaching skills. Considerable knowledge is also gained in the practicum, just as it is in the laboratory exercises in medical school or in other science educational efforts. Every bit as important, the practicum portion of the educational process relates to attitudes and to the capability of ministering to the patients as sick humans. These attitudes can only be gained by supervised experience.

Two other possibilities exist, it must be pointed out. The practicum may be just enough in hour terms as currently set forth. Possibly, there is not enough practicum in the present program. A careful, scientific study of what the practicum is all about and how long and how much and in what detail it must be taught to the average student must be undertaken. In the meantime, I would propose that the experience gained over many years not be abandoned and that the practicum be maintained at about its current level until evidence is adduced that it should be decreased or increased in length.

Indeed, all factors of hours should be up for discussion, review and carefully designed experimentation. Such experiments should be related to student needs and product aims rather than administrative constraints. Indeed, the same searching look should be applied to the "didactic" portion of the educational process rather than the practicum alone. Are the right subjects being taught? Could not some of these be manipulated, decreased in length and increased in intensity? Should not new areas be considered for the educational process (electronics, administration, educational skills, etc.)?

Should the educational process be tailored to the needs and aspirations of students rather than tailoring the students to the constraints of the curriculum? How can the educational process help in the creation of tomorrow's administrators and tomorrow's more advanced allied health professionals?

Changes in the practice of radiology itself are so sweeping, the demands being made on radiologists themselves so much greater than in the past, that it seems to me that an educational process that simply replicates today's radiologic technologist will result in the production of individuals with skills, knowledge and attitudes insufficient for health care activities in the foreseeable future. If radiologic technologists are to assume their appropriate place on the health team, the process of education itself must help them prepare for the future rather than simply giving them the skills necessary for today. I submit that the true function of the educational institution goes beyond vocation in its immediate sense. I propose that educators have the responsibility to prepare their students for the future as well as for the present. I believe that we should address ourselves to the root issues of the educational process in radiologic technology and that these are more significant and more basic than the hours of practicum or college administrative rules. I hope that this meeting will address itself to the functions of education in this important field rather than simply to its mechanics.

Reactor: Phillip G. Koppang, R.T.
Supervisor, Radiology
Department, Mercy Hospital

Certainly our work is cut out for us during this Conference. The challenge has been presented.

A free society requires intelligent support, that the individual has worth and dignity, and that a community college has obligations both to society and to the individual. As a corollary to these premises the college realizes that in its role as a community college it must remain sensitive to changes in the needs of its area, and evolve its educational offerings in response to those needs. Certainly the educational needs of radiologic technology are changing, and the community colleges are extending their offerings. The progress of college hospital affiliated training in radiologic technology has been a slow process. Indeed many advantages are apparent in this method of training. The cost of training a radiologic technologist in a community college becomes the responsibility of the community and not the responsibility of the hospital with the financial burden placed on the patient. In the college, student recruitment and selection is much easier, also the consistency of classroom instruction is apparent, and formal credentials are required for college instructors. An opportunity is offered to the student to select a course of study he or she designs. However, affiliate methods of training are not without pitfalls.

We shall concern ourselves with two primary topics in the study of curriculum. First the didactic, or academic portion of training and secondly the hospital practicum. The area where most college programs seem to be in agreement are the AMA instructional requirements. From this point there seems to be wide differences in course content. Since community colleges are autonomous, and the administration of such programs will vary, then we can only expect some differences to appear. Other problems are individual state educational requirements, and in some cases, state licensure requirements.

Associate degree programs consist of a minimum of sixty semester units. The common practice is to take the present AMA standards for didactic instruction and develop courses of instruction to include the required areas. From this point gross differences appear in the individual programs. If we are to accept the premise that the purpose for college hospital affiliate training is to first produce a working staff technologist, and secondly give a firm foundation for continuing education beyond the associate degree level, then we must take a serious look at the number and quality of additional courses offered by the college above the number required presently for radiologic technology. Transfer credit to a four year institution must be considered if we are to give the student the maximum opportunity to continue his or her education. Certainly there is a greater opportunity for lateral and vertical mobility with a college background.

Community colleges are considered two year institutions, yet the current AMA requirements including practicum extend beyond two years in most cases. Hence a college will lose contact with the student after completing the degree requirements. We must then face the problem in correlating the work at the academic institution with the practicum at the hospital. Some programs offer the entire training including practicum in a twenty-four month period, including an associate degree. Yet other programs cover a four year period with the didactic and practicum separated, and the majority of community college programs fall between these two. It becomes necessary to define how long it takes to train a technologist with the college-hospital affiliate method.

Instructors' qualifications can be established by meeting State requirements for teaching in community colleges, however these conditions do not apply for the practicum in the hospital. In many programs after the student has completed his college requirements, and upon entering the practicum portion of training, the responsibility of the college is completed. The student is now under the jurisdiction of the hospital for completion of training. It does not seem reasonable to have specific requirements for the college instructors during the didactic portion of training and no requirements for the instructors during the practicum phase of training. Certainly improvement is needed in correlating instruction between the college and the hospital.

The objectives of this workshop should certainly include: evaluation of current curriculum standards, transfer units, necessary laboratory facilities, improved college-hospital correlated practicum, and minimum requirements for hospital instructors.

A SYSTEMS APPROACH
TO
CURRICULUM DEVELOPMENT

Reactor: Richard B. Otte, Ph.D.
Research Associate
U.S. Office of Education

Goals and Constraints

A system must be goal-directed. In education, the goal is learning. It is important to be able to know if a system is achieving its goals. More specifically, it should be possible to measure (a) when and how well a specific goal is being met by the system and (b) which system elements are contributing in an acceptable way toward meeting that goal. This calls for precision in designing a new system or identifying the significant elements in an existing system. In addition, it also calls for a "feedback loop," i.e., a means for measuring effectiveness, for evaluating the results, and for modifying or revising the system, as necessary, to better meet the goal.

There is a relationship between the goals stated and the system needed to accomplish the goals. In a university, the goals of each school should be a subset of the university goals. Similarly, the goals of a department should be a subset of the goals of the school. The point is that the goals of the larger system have an impact on what are acceptable goals for the smaller systems (i.e., subsystems) of which it is composed.

In the systems approach, system elements--people, materials, equipment, procedures, strategies, etc.---must be justified or justifiable, in a measurable way, in terms of their contributions, quantitatively and qualitatively, to achieving the specified goals. The feedback-evaluation-revision process is intended to determine how well a particular component is performing. If the performance is below the minimum acceptable level, the element must be modified or eliminated (perhaps to be replaced with some alternative).

Define Target Population

A primary consideration in designing any instructional program is who the program is for and what these students will be like when they start the program. The characteristics of the target population have implications for virtually all aspects of the program design and, for this reason, it is important to "define" the target population at an early stage in the design activities.

The specific characteristics of the target group, including the degree of homogeneity or heterogeneity, provide information needed to most effectively make decisions in such areas as the following:

Knowledges and skills to exclude because the target group possesses them

Entry competencies to plan for in knowledge-skill areas pertinent to the program

Probably areas for prerequisite deficiencies

Attitudes to contend with, positive and negative, including level of achievement motivation

Probably differences in learning rates or amounts of learning per unit of time

Appropriateness of different instructional strategies, including media applications.

Specific information about special learning problems, attitudes and behavior patterns are used in determining where the starting point actually is for a group of learners. It is necessary, in other words, to determine the learners' "entry behaviors"--the knowledge and skills they already possess, as opposed to those they do not possess, with respect to the general area in which learning is needed. These may include abstract concepts and principles, language skills, manipulative skills, or a new set of attitudes.

Specify Learner Performance Objective

After the educational goals, or general objectives are defined, the target population described, and the overall constraints identified, the learner performance objectives must be specified. The general objectives of a prepared course of study have to be translated into specific performance objectives. For each, goal or general objective the question must be asked, what do we want the student to be able to do to demonstrate that he achieved the learning goal? All performance objectives should be stated in the Mager fashion--they should be measurable, observable, unambiguous, and feasible.

Learning objectives having to do with knowledges and skills are often very difficult to reduce to measurable form-and to gain agreement from others that these, in fact should be the objectives. People can usually gain agreement at more general levels. Disagreements usually occur when an attempt is made to go from the general to the specific. For example, we may all agree that we want to teach good citizenship in, say, a social studies course, but I wonder if we would all agree on what good citizenship is and what can or should be taught and learned in the time available.

Learning objectives having to do with changing attitudes, such as promoting a better understanding between alienated minority youth and members of their parents' generation are difficult to quantify or render measurable. But even such objectives must be specific if we are ever to measure attainment.

A tool used in specifying and reviewing objectives is the learning hierarchy chart. One of these can be developed for each instructional topic to be included in a course. Each box on such a chart should summarize (1) the subject matter content and (2) what the student is to do to demonstrate his understanding of it. The preparation of such a chart, which is preliminary to stating the complete performance objectives and test items for an instructional topic, is an iterative process requiring interaction between a senior behavioral technologist and a senior subject matter specialist.

At the top of the chart is the terminal performance objective of the topic. (Some topics have a number of terminal objectives). At the bottom of the chart are performance objectives which reflect the performance repertories that students are expected to possess at the time they begin to study a topic. It is also necessary to specify the intermediate performance objectives that enable the student to progress from his entering repertory to the terminal performance objectives.

It has been found to be very important to first gain agreement on hierarchy charts. After this, the formal performance objective may be prepared to reflect the charts in a rather straight forward fashion.

Criterion Tests

Three or more criterion test items should be prepared for each performance objective. A criterion test item is intended to answer the question: Has the student achieved the related learning objective? The items should yield a yes or no answer for each objective. Test items should be subjected to essentially the same review process as performance objectives. Test items are used to construct pre-tests, post-tests, practice tests, and learning-imbedded tests, all of which are elements of a course designed to reflect advancement in curriculum developments.

Sequence the Instructions

Consideration must be given to the sequencing of the elements of the course being developed. A macro-sequence chart must be created which provides a framework for subsequent course planning activities. The course may be divided into core, remedial, and enrichment areas--and each such area may be further divided into time segments. With this preliminary course structure laid out, it becomes possible to assign instructional topics or events to segments.

The sequencing activity also includes determining when pretests and post tests should be given, when counseling should be available, and what options should exist for the student at specific points in the course. Sequencing decisions may be recorded in a "Micro-Sequencing Chart."

Select the Media

Media selection criteria should be derived from the variables which determine media "effectiveness." One class of criteria may be derived from the requirements of specific learning situations, and these may be called the "micro" criteria. A second group of criteria, often overlooked, may be derived from the general environment in which the learning situations are to be provided. These are termed the "macro" criteria.

The result of micro-criteria analysis is a statement of the media capability requirements.

The media capability requirements must then be compared with the characteristics of media feasible for consideration. This produces two groups of media, one that is "acceptable" and one that is "unacceptable", based on attempts to match requirements with capabilities.

The macro criteria are used to select from among the acceptable media those specific media which seem to be best for the course in question.

Materials Development and Validation

It is necessary to prepare learning materials as well as the administrative materials which support them. Learning materials must be prepared for all of the media.

At the first step in materials preparation, detailed materials specifications must be prepared for the subject matter-authors who prepare materials. Then, experienced consultants are contacted about preparing learning materials to meet the specifications. An orientation program is provided for these consultants. At this orientation, the philosophy of the course is discussed and the materials development specifications are reviewed. Materials preparation assignments are generally made to conform to the expressed interests of the individual consultant.

The work flow requires that the consultant review the performance objectives and test items for accuracy and content validity. Materials released by the consultant are given the following treatment:

> A behavioral check by a behavioral technologist, using a checklist,
>
> A final instructional check by the consultant,
>
> Editing by a professional editor,
>
> Printing and duplication of packages for in-house preliminary tryouts.

The following are examples of macro criteria for selecting from among acceptable media. The "best" media will provide for, facilitate, or otherwise be compatible with these criteria and what they represent.

> Self-pacing--high priority must be placed on students proceeding at their own pace.
>
> Self-management--within broad limits, the student should be able to manage his own time and exert control over his own learning situation.
>
> Cognitive structure--it is desirable to be able to demonstrate patterns and inter-relationships in problem-solving, real-world simulation circumstances.
>
> Motivation-the management of motivation should be enhanced by media (i.e., the media must reflect student characteristics).
>
> Administration-operation--the media strategy must fit within the administrative and operational constraints imposed by the environment.
>
> Acceptability-the media strategy must be acceptable to the faculty who will be affected and to the students for whom it is intended.
>
> Implied costs--the implied costs of the media or media sequences should be exploited (a simple change of the media is often refreshing and motivating to the student).
>
> Sequencing--media usage by the student and transitions from one medium to another must appear unhurried, smooth, and rational to the student.

The macro-criteria that should be employed will vary simply because the variables will differ between situations. This is important, since what is desired is a media program that will meet the requirements of a given situation. The list of specific variables that could be important at the macro level could be quite lengthy.

Preliminary Testing

Students who generally resemble the target population in respect to academic background and achievement are used for preliminary testing of the material. These students take course materials in the same sequence as the target population will take them.

The main purpose of these tryouts is to discover ambiguities, information gaps, terminological problems, prerequisite inadequacies, or any other problem that may hinder achievement of the performance objectives. Materials that do not produce the desired learning are revised until they do. An interview technique is used in conjunction with item analysis and other techniques to identify where students encounter problems in the learning process. It may be necessary to go through several tryout-revision cycles before an instructional segment is satisfactory.

The way in which learning packages are constructed makes it possible to identify with great precision where a change must be made in a segment to improve it. In the Self-Instructional Printed Packages, for example, an analysis of performance on the criterion test could indicate the segment, page within segment, paragraph on the page, and sentence in the paragraph that caused the learning difficulty.

Validation Testing

Validity testing of this type course requires measures on these kinds of data.

Learning time
Learning-imbedded student responses
Self-Test student responses
Criterion pre-test responses
Criterion post-test responses
Medium-use record per student
Student course critique information
Instructor course critique information
Critical incidents

The data collected during the course validation is used as the basis for making revisions that improve the course from the stand-point of student achievement and faculty-student acceptance.

The criterion for flagging a learning materials "problem" during validation is usually high, i.e., if ten percent or more of the students fail to achieve a given learning objective, that objective and its associated test items and learning materials would be subjected to a detailed analysis to determine why this was the case. The analysis will indicate what action, if any, should be taken.

Course Evaluation and Purpose

The evaluation phase of the project, which follows the course validation phase, has several objectives:

To provide a second validation trial for the course,

To obtain final instructor-student acceptance information,

To obtain media effectiveness data,

To reappraise the development steps in light of empirical results,

To document the final curriculum development model.

Media Effectiveness

One of the key questions the evaluation seeks to answer is the effectiveness of media as utilized in the course. If it is assumed that anyone can learn anything given enough time, then what becomes important is enabling the student to learn within the amount of time available to him. Therefore, media effectiveness actually the media-materials strategy effectiveness can be measured in terms of amount of learning produced per unit of time. This permits an "efficiency" value to be calculated for purposes of comparison.

The efficiency of the key media employed in the course must be considered. The cost of developing materials is computed, and a cost-effectiveness values produced. These cost-effectiveness values reflect media-materials combinations only as employed in this situation.

Experimental hypotheses are also tested duting the evaluation phase. These hypotheses might concern the following areas:

General effectiveness of an audio-based media mix compared with a visual-based mix, Utility of a specific audio technique in combination with complex visual graphs for increasing learning efficiency for some students,

Computer simulation of subject matter models as a means of providing a cognitive structure that will reinforce and enrich prior learning,

Use of 16 mm film as a supplementary medium that augments the primary instructional approach and increases learning efficiency.

The Curriculum Development Model

A curriculum development model essentially a "how to" guide based on the project experience has been created and is now available through the ERIC system. The ED number is ED 043 791 and the AA number is AA 000 626. These numbers should be used in ordering the document from ERIC. The objective has been to produce an empirically-based guide that will enable curriculum developers to design and implement cost-effective learning programs to meet identifiable educational needs.

TRAINING OF RADIOLOGIC TECHNOLOGISTS IN THE U.S. AIR FORCE

Special Resource Speaker: Anton Zembrod, CMSgt., R.T.
USAF, Medical Services School

The training of radiologic technologists in the U. S. Air Force is accomplished in two phases. Phase I consists of 14 weeks or 420 hours of didactic training at the Medical Service School. Phase II is a combination of clinical and didactic training for a period of 90 weeks at an AMA approved Air Force Hospital. Since the clinical portion does not vary considerably from the training provided in civilian hospitals, I will limit my discussion to Phase I, the didactic training.

At the Medical Service School we have eight energized radiographic units. A whole body radiographic phantom is available for each exposure room. To assure maximum laboratory experience for all students we limit the number of students per shift to 24. Normally we have an "A" shift from 6 a.m. to 12 noon and a "B" shift from 12 noon to 6 p.m. for a total of 48 students. Each shift has seven instructors assigned, all of whom are radiologic technologists who have completed an eight week technical instructor course where they are taught such things as teaching methodologies, lesson planning, counseling methods, and testing procedures.

The curriculum presently used at the Medical Service School is the result of much experimentation, and in my opinion, our experience can be a valuable asset to any college affiliated training program. Our objective is to bring the students to a level where they can expertly produce standard radiographs on phantoms. We prefer the term standard instead of routine because we impress upon our students that each patient is an individual case and not a routine. We have found that our graudates have no difficulties in transferring the knowledge and experience gained on phantoms to actual patients when they enter the clinical phase of training. The 14 weeks didactic training is divided into 12 blocks conducted in the following sequence:

Block I (32 hours) - The students are introduced to the basic fundamentals of radiologic technology. In this block we produce the so called "button pusher." Under very close supervision students learn to produce radiographs without knowing what they are doing. The intent is to have them operate radiographic equipment as soon as possible, to motivate them, and to raise questions in their minds which are answered later. The results of this approach have been astonishing. At the end of the block the students take a written examination. If a student makes less than 60% he is given six hours of remedial training. If he fails the retest he is eliminated from the course.

Block II (36 hours) - The students are introduced to osteology and positioning with the aid of programmed teaching material. We then integrate the instructions in osteology and the standard radiographic positions of the upper extremities. We found this method very effective because the students are able to relate the osteology to the radiographs while it is still fresh in their mind. At this point I would like to tell you how we teach radiographic positioning. To encourage active participation the students first study a given position in their workbook, then, the instructor, with the aid of slides, brings out the important points using the discussion method of teaching. After several positions are covered the students complete a written exercise to reinforce what they have learned.

The students are now assigned, in groups of six, to different exposure rooms where an instructor demonstrates the positions. After the demonstration, three students are assigned to each exposure room for practice. One student is the patient, one the technician, and one the evaluator. Obviously, no radiographic exposures are made. When the students show proficiency they are permitted to produce the corresponding radiographs with the phantoms. Again, a written test is given at the end of the block to determine the need for remedial or possible eliminations.

Block III (36 hours) - The students are taught the theories and fundamentals of radiography, including darkroom chemistry and processing techniques.

In Block IV (36 hours) we cover control of film quality. At this time the students have enough background to appreciate the importance of proper exposure factors, and the need for accesory devices such as collimators, cones, and grids. Approximately 50% of this block consists of laboratory experimentation.

In Blocks V, VI, and VII (Total 112 hours) the osteology and the standard radiographic positions of the lower extremities, thorax, vertebral column, skull and facial bones are taught. In addition to the written end-of-block tests students are now required to pass performance tests.

In Block VIII we devote 30 hours to Anatomy & Physiology. In addition we have 12 hours to teach the positioning of the chest and abdomen.

Block IX (24 hours) consists of an introduction to portable radiographic units, aseptic and sterile techniques, bedside and surgical radiographic procedures, and the operation of x-ray equipment under field and disaster conditions.

Block X (30 hours) - Here the students learn special radiographic techniques such as body section radiography, stereography, scanography and foreign body localization. They are also introduced to specialized equipment such as image amplifiers, cine, closed circuit television, and pressure injectors.

Block XI (30 hours) starts off with lectures on contract media and emergency reactions. We then introduce the students to rapid film changers and to special procedures with emphasis on the anatomy to be demonstrated. During this block a carotid arteriogram is simulated. The instructor plays the role of a temperamental neurosurgeon, while the students assist and function as technologists.

The final block of 53 hours is designed to prepare the students for emergency call. They are required to produce radiographic projections out of text books with minimal supervision. Also, we bandage and splint the phantoms and they are given a list of projection which must be produced with little or no movement of the phantoms. Radiation protection is taught throughout the course but especially reemphasized in this final block of instruction.

In conclusion, the curriculum that I have outlined was designed with the objective to give students a solid background in radiologic technology before they enter the clinical portion of training. Our experience has shown that with such a background the clinical training is far more effective. Patient exposure to ionizing radiation is reduced because the students make most of their mistakes on phantoms rather than patients. Furthermore, under the guidance of good clinical instructors these students develop into outstanding radiologic technologists in less than the two years required by the ARRT. I sincerely believe that a similar approach could lead to an effective two year associate degree program, with a major in radiologic technology, and yet enhance the clinical aspect of training.

ASSOCIATE OF SCIENCE PROGRAM
IN
RADIOLOGIC TECHNOLOGY

Special Resource Speaker: Richard Palmer, Ph.D.
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INTRODUCTION

In recent years there has been considerable discussion between radiologists, radiologic technologists, educators, physicists, and public health personnel regarding the desirability and/or need for college programs in radiologic technology. Many colleges have initiated degree programs, but little or no common denominator exists between the programs at different institutions in regard to level of training and academic content of the curriculum. In an effort to remedy this situation the National Center for Radiological Health awarded a contract to Emory University to study the educational needs of radiologic technologists and to design a curriculum to satisfy these needs through college degree programs. This presentation is a summary of the results obtained to date.

BACKGROUND

In the Third Report to the Surgeon General by the National Advisory Committee on Radiation, the Committee takes note of a number of problems which are of importance in terms of radiation exposure and quality of medical care in the United States. Of foremost importance is the increasingly severe shortage of manpower in all branches of the radiological sciences. Many reports have been concerned with these shortages, but an identification of the extent is very difficult to obtain. Many experts in the health field indicate that these shortages do exist in every one of the 35 recognized specialties of physicians and in the underlying support structure. Manpower needs for physicians and allied health personnel are expected to rise continuously during the next decade. Chart 1, which is taken from Table A-3 of United States Department of Labor Report No. 323, is a summary of the health manpower needs projected through 1975.

Chart 1

ESTIMATED MANPOWER NEEDS IN SELECTED HEALTH OCCUPATIONS RESULTING FROM GROWTH OF EMPLOYMENT REQUIREMENTS AND NET REPLACEMENTS, 1966-75.

Occupation	Employment—1966	Employment Requirements-Projected 1975	Manpower Needs 1966-75 for		
			Growth and net replacements	Growth	Net replacements 1/
Medical "professions"					
Physicians 2/	295,000	390,000	145,000	95,000	50,000
Dentists	97,500	125,000	45,000	27,500	17,500
Optometrists	17,000	20,000	6,100	3,000	3,100
Podiatrists	8,000	9,600	3,000	1,600	1,400
Nursing					
Aides, Orderlies, and attendants	700,000	1,080,000	690,000	380,000	310,000
Professional nurses	620,000	860,000	390,000	240,000	150,000
Licensed practical nurses	300,000	465,000	290,000	165,000	125,000
Other professional and technical					
Pharmacists	120,000	126,000	38,000	6,000	32,000
Medical x-ray technicians	72,000	100,000	51,000	28,000	23,000
Medical laboratory assistants	50,000	100,000	70,000	50,000	20,000
Medical technologists	40,000	75,000	50,000	35,000	15,000

Occupation	Employ-ment 1966	Employment Requirements Projected 1975	Manpower Needs 1966-75 for		
			Growth and net re-placements	Growth	Net replace-ments 1/
Other profes-sional and technical (con't)					
Physical therapists	12,500	27,000	19,500	14,500	5,000
Medical record librarians	12,000	18,000	10,000	6,000	4,000
Occupational therapists	6,500	16,500	13,000	10,000	3,000
Dietitians	30,000	38,000	17,000	8,000	9,000

1/ Net replacements include separations from the labor force because of deaths, retirements, family responsibilities, or other reasons, minus workers qualified in the occupation returning to the labor force.

2/ Includes Doctors of Medicine (M.D.) and Doctors of Osteopathy (D.O.)

In terms of the radiological sciences there are shortages of engineers, chemists, physicists, biologists, and radiological health specialists as well as x-ray technicians and administrative personnel. The current shortage in these areas is essentially due to "lack of attractiveness of pay and working conditions in health occupations by comparison with other jobs." The first chart shows that there were 72,000 medical x-ray technicians in this country as of 1966 and that this number will increase to 100,000 by 1975. Currently some 30,000 technicians are certified by the American Registry of Radiologic Technology (ARRT), and approximately 5,000 technicians are registered by the American Radiographic Technologists (ART). The number of registered personnel is expected to increase to 50,000 by 1975. Of concern is the fact that nearly 50 percent of the x-ray technicians are not certified presently and that this percentage will remain unchanged in the future.

In describing this latter group Dr. H. L. McMartin uses the words ".... and are untrained in x-ray technology." In referring to x-ray technicians Dr. A. B. Soule uses the word qualified as synonymous with registered by the ARRT-- "...qualified (registered) technologists." In essence the descriptions are valid, for in a recent survey the Public Health Service found that in several States surveyed "only about one-half of all x-ray technicians, and only one-tenth of all non-registry technicians had any formal training in x-ray technology." Many of the people listed as x-ray technicians are in reality nurses, secretaries, receptionists, medical assistants and others working in the offices of private physicians and have obtained their status by virtue of informal, on-the-job training in radiographic procedures. As of 1966 about 24,000 technicians (84 percent registered) were employed in hospitals, while the remainder of the 72,000 technicians were employed in medical laboratories, physicians' and dentists' offices, clinics, federal and State agencies, and school systems. The above elucidation of numbers of x-ray technicians is important, for it emphasizes that the current shortages and future needs in the field are reflecting both "qualified, registered" technicians and "unqualified, non-registered" technicians. As the trend toward State licensure of x-ray technicians continues, the demand for the registered technicians may increase drastically and account for the major portion of the 100,000 technicians required for 1975. It is doubtful that the non-registered technicians with little or no formal training in x-ray technology can pass State examinations. Indeed, as was the case in New York State, many schools may cease to operate rather than upgrade their training to meet minimum standards being set by State laws, and on-the-job training will also cease to exist.

To increase the quality of the technologist, the American Society of Radiologic Technologists began some 50 years ago to promote the stature of technology through education. Through its effort a 24-month AMA-approved program was devised and put into operation in hospitals across the country which provided for the first time uniform standards for the training of technologists. Without a doubt the 24-month school has been successful in producing technologists highly qualified to perform radiographic procedures in a clinical setting, but its attachment to the hospital has reduced it to a terminal program.

Thus, the technologist is trained in his specialty with no allowance made for advancement within the field or transfer to allied fields. In essence the technologist will remain in his position with the higher positions between him and the radiologist and the corresponding higher salaries unavailable to him. According to Dr. A.N. Taylor this will remain the case as long as the training programs are hospital-based, for the hospital is not an educational institution, and the training is not applicable for college credit.

EMORY SURVEYS

With this as a background Emory divided the initial contract into three survey phases.

Survey of the job function of the x-ray technologist,

Survey of the hospital-based 24-month school,

Survey of the junior college affiliated school.

1. Function Study

Although a study of the actual function of an x-ray technologist was not a part of the Scope of Work, a limited function study was made to ascertain if a junior college program of training could be justified and designed on the present job function of the technologist. As the majority of the registered technologists are employed in hospitals, the study was limited to diagnostic radiology departments in Atlanta area hospitals. While the study is too limited in scope to have statistical significance, it is indicative of the general conditions which exist in the field.

For the function study the field was divided into four broad job classifications based upon major job responsibility:

Staff (Room) technologist

Special procedure technologist

Teaching technologist

Chief technologist

As indicated above the survey was limited to diagnostic radiology and hence radiation therapy and nuclear medicine technologists were not included. The personal interview technique was employed for the study.

A. Staff Technologists

It is clear from the study that the present function of staff technologists is amenable to apprenticeship training and that there does not appear to be any basis for justification of a college degree program. Present hospital-based programs, when properly conducted, are more than sufficient to fill this training need. There is not one facet of the skill requirement in the performance of a skull series, barium enema, etc., which requires the technologist to have a knowledge of x-ray physics, college algebra, physiology or related subjects. To rationalize that a college program would improve safety, technique, or quality is merely an indictment of present training programs, inspection procedures, and testing methods. If a need exists to either improve or standardize these factors, then a justification can be advanced for transferring training programs to vocational or technical colleges.

B. Special Procedures Technologist

The difference between the staff technologist and the special procedures technologist is evidenced by the close contact between the physician and the technologist in performing a special procedure. While the work is still routine and requires no major decisions on the part of the technologist, the procedures are more exacting and require a greater degree of competency.

C. Teaching Technologist

The teaching technologist, as the name implies, is responsible for the instruction of the student trainees on the 24-month, hospital-based program. The overall function of the teaching technologist, however, is not limited to the instructional matters but includes many endeavors.

Responsibilities of Teaching Technologists

Recruitment of students

Instruction of students in didactic material

Supervision of the practicum phase of training

Test and measurement of the students in both didactic and practicum material

Maintenance of student records

Counselling of students

Job placement

In contrast to the routine nature of the staff technologist, it is evident that the position occupied by the teaching technologist is anything but routine and that it must be filled by a highly trained technologist who will function as an administrator, a teacher, a supervisor, and a counselor. College course work in subject matter pertaining to x-ray technology such as biology, chemistry, and physics as well as work in teaching methodology is definitely indicated in the training of the teaching technologist. Adequate justification can be advanced that the "certification" of a teaching technologist should have requirements equal to those for teacher certification in the secondary school systems in this country.

Training for Teaching Technologists

Course work in x-ray technology

Clinical practicum in x-ray technology

Course work in educational methodology

Practice teaching in x-ray technology

Supplementary course work in the sciences and liberal arts

D. Chief Technologists

In general it may be stated that the chief technologist is a male technologist who has advanced to this position by virtue of longevity in the field. His training for the position consists, for the most part, of an apprenticeship to a chief technologist. Course work in business administration, supervision, personnel management, and personnel recruitment and placement is definitely indicated. Training in these subjects and the more fundamental sciences and liberal arts is desirable but not required for present function. The above method of becoming a chief technologist - longevity and experience - coupled with commercial courses seems adequate for the present function.

It must be stated that in our opinion there should exist another person above the chief technologist, namely a departmental administrative assistant, who should definitely have a degree in Business

Administration and should handle the business of the department. This should relieve the chief technologist of business matters and allow him the time to control the "quality" of his department.

2. Study of the Hospital-Based 24-Month School

The purpose of the study of the hospital based school was to determine the educational philosophy and principles which were used in setting up the standards for the didactic and practicum content of the school. Information was sought which concerned the exact amount and type of practicum required in the training of a technologist and the interrelationship of didactic and practicum material covered with the present and/or future job function of the technologist.

A brief discussion of the historical background of the hospital based school is important, for it reemphasizes that the 24-month, hospital-based school advance by the ASRT is an outgrowth of a dedication of the ASRT to upgrade and improve the field of x-ray technology. The informal apprenticeship-type training of the technologist under a radiologist, other physicians, or another technologist characterized the early history of x-ray technology. The inability of such a system to produce technologists with a common base of training and to cope with the rapid growth of radiographic procedures was recognized over 50 years ago by the technologists, themselves, and somewhat later by the medical community. The impetus toward a uniform program was given by the technologists and resulted in a 12-month program which later was extended to 24 months for what was termed adequate insurance that the technologist was skilled in patient handling. The appearance in 1954 of a teaching guide gave educational status to the program and served to define the base or core content of the approved programs. The appearance of a "Registry" served to give professional status to the technologist by certifying graduates of approved schools who could pass the Registry examination as Registered Technologists. The cooperation of the American College of Radiology and the American Medical Association in the overall development of the approved school has resulted in the almost uniform hiring of registered technologists in hospitals where the predominant radiology load is encountered. Of the 24,000 technicians employed in the hospitals in this country, 20,000 are registered technologists; thus 67 percent of the employed, registered technologists are employed by hospitals. According to Chart 1, however, there are 72,000 medical x-ray technicians, or some 48,000 technicians employed outside the hospital. Of this number only 10,000 are registered,a mere 20 percent. Thus the import of the ASRT program in standardizing and providing an "adequate" base for technician training has not been felt to a great extent outside the hospital atmosphere. Moreover, Chart 1 predicts no change in these percentages through 1975.

It is obvious that the ASRT has evidently addressed itself to the role of radiology as it applies to the hospital and/or the radiologist's office, and that a vacuum has developed in training of technologists for allied medical professions using ionizing radiation. This observation leads to the posing of several interdependent questions.

Chart 2

QUESTIONS CONCERNING RADIOLOGIC TECHNOLOGY

1. Are there two types of x-ray technologists - one for radiology and another for allied medical professions?

2. If there are two types of x-ray technologists, do both types require the same training program both in content and time requirements?

3. Is the 24-month, hospital-based school too inflexible and too hospital-oriented to provide different levels and types of training to satisfy the two different needs?

4. Should the hospital-based school even concern itself with training people for a non-hospital environment?

5. Are the nonregistered technicians (non-graduates of the 24-month, hospital-based school) being judged as unqualified by hospital standards and not by their own job function?

These questions are important for they go to the heart of the problem faced by the ASRT in its years of promoting the hospital-based school - namely that the hospital is not an educational institution but a healthcare institution. Patient care must be first and foremost; any educational program must thereby directly relate to patient care and be secondary in nature. Question 4, therefore is answered in the negative and the hospital-based school becomes a stereotyped, rigid mold for a particular technologist to satisfy a particular job function.

The problems involved are not unique to x-ray technology, for all developing professions have faced the same question in one form or another - the concept of the education of a professional versus the concept of on-the-job training for a particular job function. The educated professional adjusts to changing conditions and new procedures and is qualified to assume added responsibilities; the apprentice-trained individual must be retrained as conditions and procedures change and is unable to assume increased responsibility in a changing field.

In this sense all of the non-degree programs in x-ray technology are terminal and limited by present job function. The 24-month, hospital-based school of the ASRT, however, offers a satisfactory starting point for the development of an Associate of Science program due to its broader base of training and its didactic relationship to radiology. For these reasons it was chosen as the base for the Emory program.

In general the school runs for 24 months and gives a total of approximately 4000 hours of didactic and practicum instruction. Classroom instruction should average a minimum of five hours per week for a total of 420 hours and should follow the outline of the third chart.

Chart 3

ASRT PROGRAM OUTLINE

First Year - First Semester

Subject	Theory Clock Hours
Orientation and Elementary Radiation Protection	5 hours
Professional Ethics	4 hours
Anatomy and Physiology	30 hours
Physics	20 hours
Darkroom Chemistry and Technique	10 hours
Principles of Radiographic Exposure I	10 hours
Radiographic Positioning Section A	15 hours
Film Critique	20 hours
Total	114 hours
Office Procedures	--
Medical Terminology	--

First Year - Second Semester

Subject	Theory Clock Hours
Physics	20 hours
Radiographic Positioning (Section A (cont'd)	15 hours
Principles of Radiographic Exposure I	10 hours
Common Radiographic Procedures Using Contrast Media	8 hours

ASRT PROGRAM OUTLINE

First Year - Second Semester (con't)

Subject	Theory Clock Hours
Nursing Procedures Pertinent to Radiology	10 hours
Pediatric Radiography	8 hours
Film Critique	20 hours
	91 hours

Second Year - First Semester

Subject	Theory Clock Hours
Radiographic Positioning Section B	30 hours
Principles of Radiographic Exposure II	10 hours
Protection to Patients and Personnel	10 hours
Special Radiographic Procedures	20 hours
Topographic Anatomy	12 hours
Film Critique	20 hours
Elective	4 hours
	106 hours

Second Year - Second Semester

Subject	Theory Clock Hours
Radiation Therapy	10 hours
Intraoral Radiography	8 hours
A Survey of Medical and Surgical Diseases	15 hours
Departmental Administration	10 hours
Equipment Maintenance	6 hours
Film Critique	20 hours
General Review	20 hours
Electives	20 hours
	109 hours

The best approach to a discussion of the approved school in practice is a listing of comments pertinent to the actual operation of a school, comments which are similar to those voiced at the National Conference on X-ray Technician Training.

The Hospital School in Practice?

1. Many schools are approved for hospitals with inadequate radiology departments both in terms of staff and number of procedures per student. Too often the school is used as a source of cheap labor.

2. The school, in many cases resembles too closely the on-the-job training from which it originated.

3. The school is a terminal program and has not provided for continuing education.

4. The radiologist-director of the school has little actual relationship to the school. In general the teaching load falls on the trained technologist. Generally, this individual lacks any educational training or experience and does not have the aptitude either to organize the school or to teach therein. No formal teaching qualifications are evident as a requirement for an approved school.

5. The student quickly becomes assimilated into the radiology department as a worker; and in many cases, the hospital could not function without the student's assistance. Class work is readily postponed because of the demands of the x-ray department's work load and assumes a "catch-as-catch-can" relationship to the clinical work load.

6. There is no relationship between the progress of a student and his clinical work load. The major clinical experience consists of the routine chest film and the extremity film which constitutes the major work load of the department. An inverse relationship exists between the complexity of a procedure and the time a student spends in training on that procedure. In theory and in practice it is possible for a student to perform some large number of a simple procedure, say 1000 chest procedures, and only one of the more difficult procedures, dependent entirely on departmental work load and the student's place in the rotational schedule within the department.

7. The teaching and clinical experience are treated as two separate entities, and little or no attempt is made to arrange one to complement and reinforce the other.

8. Didactic instruction often assumes a preparation for the Registry examination with old examinations substituted for more beneficial instruction in didactic areas.

9. No adequate base for either the 420 hours of didactic instruction or the 3600 hours of practicum has been established for the school.

Overall, however, the 24-month hospital-based school, when run in accordance with the ASRT outline, is still the best vehicle for supplying x-ray technologists for radiology departments, both in terms of quality and quantity. In any attempt to upgrade within the hospital or in hospital-college combination program, extreme care must be taken not to emasculate the present hospital program and thereby endanger present and future health care.

3. Survey of the Junior College Affiliated Program

The purpose of the study of the junior college affiliated program was to evaluate the educational philosophy and principles which have been adopted in this attempt to upgrade the level of x-ray technology training. In particular the relationship between the didactic training and the clinical experience was studied in view of strengthening the clinical experience by appropriate foundations in didactic training. In this study visits were made to several junior colleges across the country with x-ray programs; and surveys were made of their staff and curriculum.

In general it may be stated that the junior college affiliated programs represent a method to upgrade the field of x-ray technology in terms of professionalism, prestige, and salary. As with the 24-month, hospital-based school these programs represent an attempt from within the technologists rank to advance themselves. The limiting requirements of the program are shown in the fourth chart.

Chart 4

REQUIREMENTS FOR JUNIOR COLLEGE AFFILIATED PROGRAMS

At least 60 semester credit hours must be spent in didactic work (960 classroom hours).

No more than 420 hours shall be in radiologic technology.

The balance of at least 540 classroom lesson hours must be from liberal arts courses and transferable to B.A./B.S. Degree.

2400 hours of practicum is required exclusive of phantom work.

For purposes of the present discussion in review of presently existing junior college programs the following comments are pertinent:

A. The only common base existing between college programs is the rigid adherence to 2400 hours of clinical practicum.

B. The programs which take 24 months to complete are identifiable as the hospital-based school with courses bearing college numbers and credit. The material covered in the didactic instructions is of high school quality and level and does not represent college level courses. In many cases the students are not a part of the regular student body and take only courses designed and taught for them. The result is that the programs are terminal with most of the work unacceptable for advanced degrees or for transfer to other fields. A clear case of a degree for the sake of a degree is evident in these programs. The quality of the technologist is clearly lower than that of the hospital school.

C. In the few programs stressing academic excellence the programs are conducted in 36 months and consist of six quarters of academic work for the Associate of Arts degree and of 2400 hours of practicum added separately. There is essentially no interrelationship between the practicum and the didactic phases of the program.

D. Where the degree is competitive with other Associate of Arts degrees in terms of time, a sacrifice of quality of didactic material has been made. In no case, however, is cause or evidence advanced for maintaining the 2400 hours of practicum at the expense of the didactic material.

EMORY UNIVERSITY PROPOSED PROGRAM FOR AN ASSOCIATE OF SCIENCE DEGREE IN RADIOLOGIC TECHNOLOGY

The program for an Associate of Science Degree in Radiologic Technology as prepared by Emory University under the subject Contract is the result of discussions with authorities in the field of technologist training programs, radiologists, administrators, educators, physicists, chief technologists, special procedures technologists, teaching technologists, and staff technologists. The program is based on the studies pertaining to function, hospital-based schools, and junior college programs.

The basic philosophy developed under this project for the Emory program is one of continued support on sound educational principles and practices which have underlined the development of the "professional man." In this sense the value and need of degree programs in radiologic technology must lie in providing the individual the capacity for upward mobility within the overall allied health professions. An education must provide the individual with the ability to see through himself and see himself through; it must enable him to crystallize his goals and to equip himself to pursue these goals. An education is a continuing process and allowances must be made for the individual to continue as the desire arises and his capacity allows. A degree must be subordinate to the educational value of any program and the practice of awarding a degree for the sake of a degree must be avoided.

In the studies performed under Contract, information was developed which revealed that the present 24-month, hospital-based school was adequate to meet the needs of present job function of hospital technologists. The same information revealed, however, an inadequacy in this type of school to meet future job functions and to provide technologists with advanced technological backgrounds to fill the many vacant positions between radiologist and technologist. The junior college programs thought to fill this need have been found to be hospital programs in disguise.

The evidence clearly reveals that there is a need for both the hospital-based school and the junior college programs. It is obvious that the first is needed to provide the bulk of the technologists for routine, present job functions, while the second is needed for advancement of the field. The professional element of present function, however, cannot be used as justification of the need, for the logical sequence is, as observed, to simply transfer the hospital-based program to a college and grant a degree. In this light a set of objectives and benefits can be advanced for an educational program as shown in the fifth chart.

Chart 5
OBJECTIVES OF AN EDUCATIONAL PROGRAM

Provide a technologist qualified for present and future job function.

Provide a technologist capable of vertical mobility within the field of x-ray technology.

Provide a technologist capable of being a team member of the allied health profession team.

Provide the opportunity for continuing education.

Provide the opportunity for lateral mobility within the allied health profession team.

BENEFITS OF AN EDUCATIONAL PROGRAM

Increased status of x-ray technology.

Improved communication between the radiologist and the technologists.

Improved communication between x-ray technology and the allied health professions.

Stabilization of the work force by increasing the number of men attracted to the field by increased status and salary.

Improvement in present and future patient care.

In keeping with these objectives and benefits we place the constraints shown in the sixth chart on the Emory program.

Chart 6

CONSTRAINTS FOR EMORY PROGRAM

Be academically strong and not job oriented.

Produce qualified x-ray technologists.

Provide the basis for continuing education at the baccalaureate and graduate level.

Provide credits which are transferable in most part to other degrees.

Be competitive in time and content with other degree programs.

Consistent with these constraints are the following set of boundary conditions for the Emory program.

1. Time commitment must not exceed 24 months.

   This follows from the fact that college AA programs are normally two academic years in length, six quarters spread over 24 months and that generally speaking, the salary of the x-ray technologist is on the lower end of the pay scale. Recruitment of the better student therefore is already expected to be a problem and will become more so if the time commitment is extended beyond 24 months.

2. The curriculum must consist of two separate components: (a) an academic portion and (b) a practicum portion with the first serving as a basis on which to build the second.

   (a) The academic portion must be biomedically oriented and taught under the college "influence", not to be confused with on the college campus. This, in effect, is to say that the college personnel - educators - will be in charge of the academic instruction and that college level courses will be taught.

   (b) The practicum portion must be well planned and executed under the immediate supervision of the chief radiologist and the teaching technologist. It must follow the didactic phase of the curriculum. It must not be in competition with the academic program but logically build itself on the didactic instruction.

3. The curriculum must be an unfolding one with every part based on the preceding part.

4. At least 67 percent of the credit hours must be transferable to any degree. An additional 50 percent of the remaining hours should be transferable as electives. This in essence means that a student who wishes to change fields after he receives his training in radiologic technology would have to spend an additional 2 quarters to achieve an Associate of Arts degree in most other fields.

The Associate of Science program is 24 months in duration and consists of three areas of endeavor as shown in the seventh chart.

Chart 7
EMORY PROGRAM OUTLINE

Area 1. Academic Work at the Junior College.

The student enters the junior college in the fall and spends the next five quarters in residence. The total credit load is 92 quarter hours.

Area 2. Course Work at the Hospital

In the second quarter the student takes Radiology 101 at the hospital and in the sixth quarter enters the hospital for his hospital-based training. Five subjects are listed in quarters six, seven, and eight, which will be covered in the hospital under the auspices of the chief radiologist and for which 16 college credit hours will be given.

Area 3. Clinical Experience

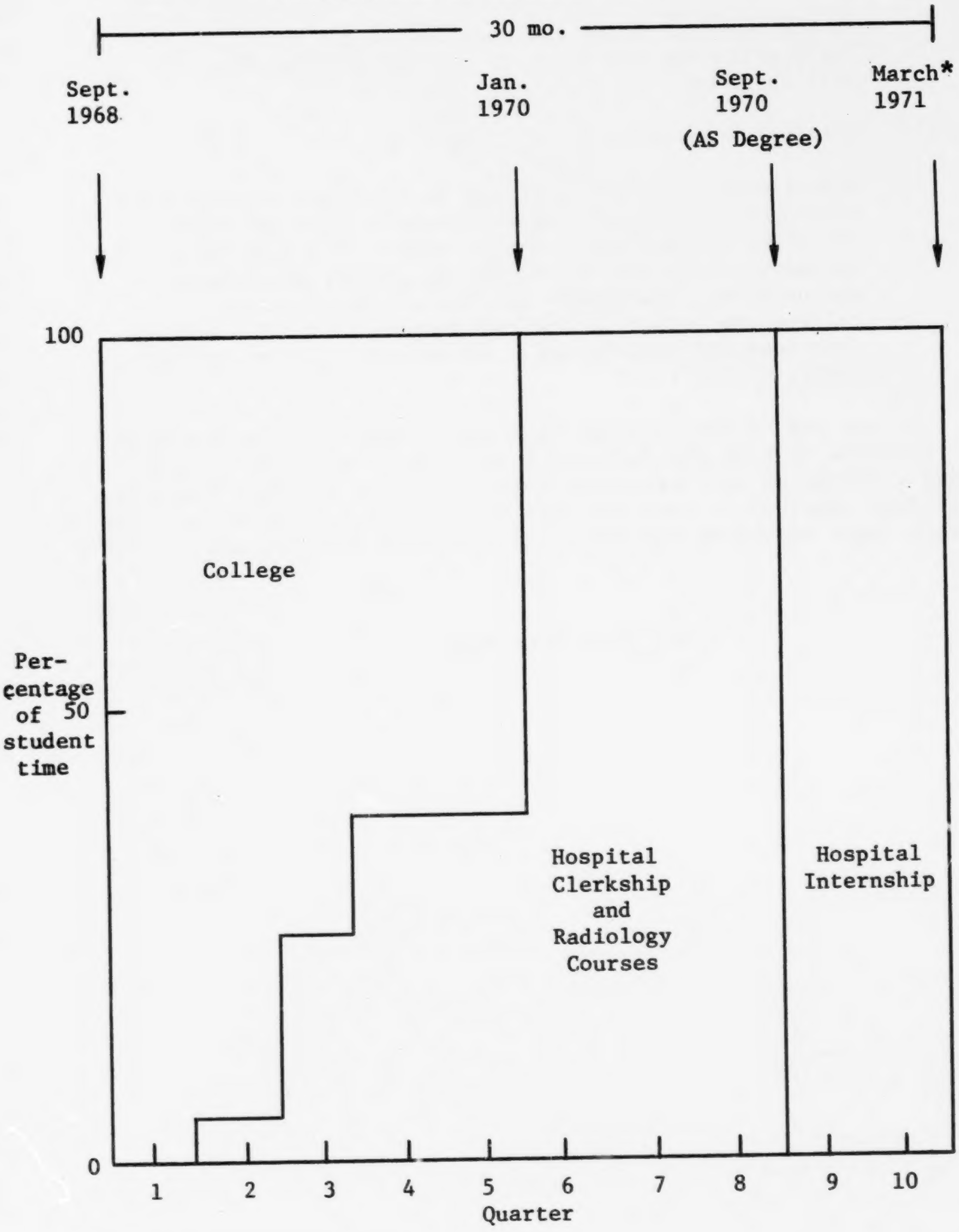
The clinical experience begins in the sixth quarter and continues through the eighth quarter. College credit is not given for any part of this work. This experience is intended solely for experience in patient positioning and handling. Radiology 204 and 205 are designed to relieve the clinic of the requirement to teach radiologic technique and positioning. Actual contact time is 1280 hours.

At the end of the clinical training, however, the graduate is not eligible to take the Registry Examination; therefore we have added 6 months of hospital internship to provide the 2400 hours of practicum required to take the ARRT Certification Examination. The eighth chart indicates the overall division of the program.

Chart 8 on Next Page

Chart 8

DISTRIBUTION OF STUDENT TIME



*Take ARRT Certification Exam, May 1971

We have attempted to achieve an S shaped curve relationship between the college and the hospital whereby the student enters the program as a full time college student and gradually becomes a full time hospital student. At the conclusion of the degree portion of the program a battery of examinations will be given to ascertain the quality of the training as of 1280 hours of practicum. These tests will be repeated at 1500, 1800, 2100 and 2400 hours of practicum to provide basis for number of hours of practicum required.

The ninth chart is a course outline of the program.

Chart 9
COURSE OUTLINE

Freshman Year		Sophomore Year	
Course	**Credit**	**Course**	**Credit**
Orientation	1	English 204	5
Biology 101-102	10	Distributive Education 206	5
Biology 111	5	History 101	5
English 101-102	10	Physical Education Activity	5
English 203	5	Political Science	5
Mathematics 101-102	10	Radiology 201, 204, 205, 206, 207, 208, 209, 210	30
Physical Education Activity	5	Radiology 211	0
Radiology 101-102	2		55
Radiology 203	5		
	53		

The tenth chart is a complete quarter by quarter scheduling outline to show how the S-shaped curve is achieved.

Chart 10

Course	Description	Qtr. Hour Credit
First Quarter		
Math 101	College Algebra & Trigonometry I	5
English 101	Composition & Rhetoric	5
Biology 101	Cellular Biology	5

Chart 10 (cont)

Orientation		1
Physical Education 101	Individual and Dual Sports	1 2/3

Second Quarter

Math 102	College Algebra & Trigonometry II	5
English 102	Composition & Rhetoric	5
Biology 102	Human Body and Function	5
Radiology 101	Introduction to Radiology	1
Physical Education 102	Team Sport	1 2/3

Third Quarter

English 203	World Literature I	5
Biology 111	Anatomy - Physiology	5
Radiology 102	Medical Terminology	1
Radiology 203	X-Ray Physics	5
Physical Education 103	Aquatics	1 2/3

Fourth Quarter

English 204	World Literature II	5
History 101	Survey of U.S.History	5
Radiology 201	Introduction to Radiation Safety	2
Radiology 204	Radiologic Technique and Positioning I (Twelve hours per week)	5
Physical Education 104	Conditioning and Self-Testing Activities	1 2/3

Fifth Quarter

Political Science 101	American Government	5
Distributive Education 206	Personnel Management	5
Radiology 202	Administration and Management	2
Radiology 205	Radiologic Technique and Positioning II (Twelve hours per week)	5
Physical Education 105	Health Fitness	1 2/3

Sixth, Seventh, Eighth Quarters - 36 weeks (40 hours/wk) for 1440 hours

Physical Education 101, 102, 103, Or 104		1 2/3
Radiology 206	Radiographic Procedures	5
Radiology 207	Elements of Nursing	3

Chart 10 (cont)

Radiology 208	Radiation Therapy	3
Radiology 209	Nuclear Medicine	3
Radiology 210	Survey of Medical & Surgical Diseases	2
Radiology 211	Clinical Clerkship (1280 hours)	0
	Total	108

Clinical Internship - (1120 contact hours)

The eleventh chart gives the program time commitment based on Emory standards.

Chart 11

PROGRAM TIME COMMITMENT

Time Division	Hours per Week	Hours per Quarter	Total Hours
First Quarter (12 weeks)			756
Class	14	168	
Laboratory	4	48	
Physical Education	3	36	
Preparation	42	504	
Second Quarter (11 weeks)			693
Class	14	154	
Laboratory	4	44	
Physical Education	3	33	
Preparation	42	462	
Third Quarter (11 weeks)			693
Class	14	154	
Laboratory	4	44	
Physical Education	3	33	
Preparation	42	462	
Fourth Quarter (11 weeks)			759
Class	14	154	

Chart 11. (cont)

Time Division	Hours per Week	Hours per Quarter	Total Hours
Fourth Quarter (cont)			
Laboratory	10	110	
Physical Education	3	33	
Preparation	42	462	
Fifth Quarter (12 weeks)			828
Class	14	168	
Laboratory	10	120	
Physical Education	3	36	
Preparation	42	504	
Sixth, Seventh, Eighth Quarter (36 weeks)			1850
Class	12	120	
Laboratory	6	60	
Physical Education	3	30	
Preparation	36	360	
Hospital Clerkship	-	1280	
		Sub total	5579
Six Month Hospital Internship			1120
		Total	6699 hours

5579 hours/93 weeks = 60 hours/week

1120 hours/25 weeks = 45 hours/week

STATUS OF EMORY PROGRAM

Based on the program outline Emory recruited 11 students in 1969. The twelfth chart indicates the present status of these students.

Chart 12

COLLEGE ENTRANCE EXAMINATION BOARD SCORES

Score	No. of students	Results
1150 +	1	Continuing program
1100		
1050		
1000		
950	1	Continuing program*
900	1	Married and withdrew
850	1	Financial problems - withdrew
800	1	Transferred to 4 year college
750	2	Failed
700	2	One continuing program** One transferred to other specialty
No scores	2	One transferred to 4 year college One failed

---

*ARRT Registered Technologist

**Student took two extra quarters of remedial math before entering program

The most surprising aspect is that over half of the students are below 850 on the College Entrance Examination Board scores and are, in essence, remedial students. In the early survey of hospital-based schools we had been verbally informed that the average level of the hospital student was 900-1000 on this same examination. Our recruitment had been extensive and included:

consultation with high school counselors

consultation with college counselors

visits to high school science clubs

distribution of brochures to local high schools

participation in allied health days

personal interviews

At this time we are trying to compile College Entrance Examination Board scores on hospital-based students. As you may expect this is a difficult task, and we have been largely unsuccessful in this endeavor. The thirteenth chart presents the College Entrance Examination Board scores of the Emory hospital-based students.

Basically the division is the same as for our college program. Sixty percent of the students are below the level to pass college algebra, trigonometry, and English without extensive work. In essence our program has appealed to the same general cross-section of students as did our hospital program. The major difference - all of the hospital students eligible for the ASRT exam have passed; only three of our college students are passing with two of these on the borderline.

In view of the 12th chart and other factors we have changed some of the content of the Emory program. The 14th chart is a course outline of the new program.

The major change is the elimination of Math 102, trigonometry, and English 204 together with Biology 101 and 102. In place of these courses we have enlarged the physics sequence. We feel that the change allows the 850 students a better opportunity to complete the liberal arts portion of the program. The additional physics courses are definitely needed to enable us to teach the physics of radiology courses on a college level.

Chart 13

COLLEGE ENTRANCE EXAMINATION BOARD SCORES

Score	Year of Entry into Hospital Program						Total Students	Average* Registry Score
	1965	1966	1967	1968	1969	1970		
1150 +		2					2	95
1100					1		1	
1050			1				1	91
1000			2		1	1	4	95
950		2	1		1	1	5	93
900			2		1	1	4	96
850		1	1	1	1		4	88
800	2		2		2		6	81
750	2	2			1	1	6	87
700	2	1		2	2	4	11	86
650			1		1	2	4	79
600	1			1	1		3	80
550						2	2	
500								
Above 850	0	5	7	1	5	3	21	93
Below 850	7	3	3	3	7	9	32	83

*Exclusive of 1969 and 1970 classes

Chart 14

COURSE OUTLINE

Freshman Year

Course	Credit
Orientation	1
English 101 - 102	10
History 101	5
Mathematics 101	5
Political Science 101	5
Physical Science 101	5
Psychology 101	5
Physical Education Activity	5
Radiology 101, 102, 103	4
Radiology 111, 112	10
	55

Sophomore Year

Course	Credit
English 203	5
Physical Education Activity	5
Physical Education 119	5
Radiology 104	5
Radiology 201, 202, 204, 205, 206, 207, 208, 209	28
Radiology 211	0
	48

The 15th chart is a quarter by quarter outline for the new program.

Chart 15

Course	Description	Qtr. Hour Credit
First Quarter		
Math 101	College Algebra & Trigonometry	5
Physical Science 101	General Survey of Physics & Astronomy	5
English 101	Composition & Rhetoric	5
Orientation		1
Radiology 101	Introduction to Radiology	1
Physical Education 101	Individual and Dual Sports	1 2/3
Second Quarter		
Radiology 111	Atomic and Nuclear Physics	5
Radiology 102	Medical Terminology	1
English 102	Composition & Rhetoric	5
Political Science 101	American Government	5
Physical Education 102	Team Sport	1 2/3
Third Quarter		
Radiology 112	Physics of Diagnostic Radiology	5
Radiology 103	Survey of Medical and Surgical Diseases	2
Psychology 101	Principles of Psychology	5
History 101	Survey of U.S. History	5
Physical Education 103	Aquatics	1 2/3
Fourth Quarter		
Radiology 104	Anatomy and Physiology	5
Radiology 201	Introduction to Radiation Safety	2
Radiology 202	Administration and Management	2
Radiology 207	Elements of Nursing	3
Physical Education 119	First Aid and Safety	5
Physical Education 104	Conditioning and Self-Testing Activities	1 2/3
Fifth Quarter		
Radiology 204	Radiologic Technique & Positioning I (12 hours per week)	5

Chart 15 (cont)

Course	Description	Qtr. Hour Credit
Fifth Quarter (cont)		
Radiology 209	Principles of Nuclear Medicine	3
English 203	World Literature I	5
Physical Education 105	Health and Fitness	1 2/3
Physical Education 101, 102, 103, or 104		1 2/3
Sixth, Seventh, Eighth Quarters	(1400 contact hours)	
Radiology 205	Radiologic Technique & Positioning II (12 hours per week)	5
Radiology 206	Radiographic Procedures	5
Radiology 208	Principles of Radiation Therapy	3
Radiology 211	Clinical Clerkship (1250 hours)	0
		103

Clinical Internship - (1150 contact hours)

What Have We Learned?

The Emory program is still in its testing stage, but even now we can list several points that seem well established.

The 24-month, hospital-based school is required to train the bulk of the staff technologists needed to operate the clinical department of the hospitals. The hospital, although not an educational institution, does an excellent job in this area when the ASRT outline is followed both as to didactic and clinical experience.

The majority of the students presently attracted into x-ray technology do not possess adequate academic backgrounds to do well in college courses bearing transferable credit without extensive remedial course work. Either the standards for junior college affiliated programs must be lowered (essentially no transferable hours), or the college must attempt to train the few "advanced" students. We, at Emory are directing our efforts at training a small number of students to be "advanced technologists" to fill positions now available between the radiologist and the staff technologist and to meet future requirements of the field. We have integrated our college program and our separate 24-month hospital program with regards to recruitment and placement such that we encourage the student into that program that best suits his talents, his goals, and his ability to finance a college program (money is an important factor, for colleges charge tuition). We have further integrated those courses which are essentially common to both programs such as medical terminology, medical and surgical diseases, anatomy and physiology, and nursing procedures. The small number of college students allows the instructor to assign outside material to the college students, to meet with them in study sessions, and to employ more extensive testing. The hospital students benefit for they get a deeper, more meaningful course taught by an M.D. or PhD. instructor.

In regards to lowering the standards we at Emory are against any effort to lower the number of transferable hours below 60 quarter hours of liberal arts where we define transferable as "meaning acceptable to the appropriately accredited State University." Acceptability at private and non-accredited colleges should not be used as guide-lines in establishing transfer credits.

Contrary to our original beliefs concerning the practicum, we are finding that the learning pattern of our most advanced student is not appreciably different from that of the hospital student when it comes to actual patient handling.

> To state it bluntly it takes the college student equally as long to become "competent" in a given radiographic procedure as it does the hospital student. The simulator laboratories with phantoms and various types of teaching aids have not contributed measurably to achieving proficiency in patient handling. Again let me repeat that it is early in our testing stage that we make this statement, but it appears that Mr. Cahoon was entirely correct when he stated to us some two years ago, "It is the development of proficiency in patient handling that determines the time requirement for practicum." At this point we would suggest that 2400 hours of practicum is the correct ball park figure required to produce a technologist equally competent as the hospital graduate.

We must point out, however, that it is equally evident that the college student exhibits a greater in-depth knowledge of the actual physical requirements of the procedure, both machine and patient parameters.

> We have not investigated and therefore have learned "nothing" concerning the requirements for training technologists for environments other than radiology departments in hospitals.
>
> In passing let us state that we have relearned that there are at least 50,000 trained and registered technologists who are currently inactive in the field. We are trying to reestablish contact with these individuals in the Atlanta area.

RECOMMENDATIONS

1. The 24-month hospital-based school must be maintained. Any attempt at rewriting standards or requirements for training that reduces the quality of the technologist should be strongly resisted. The only institution that Emory would accept as director of the hospital school is a bonafide Allied Health Department of a bonafide medical school.

2. It is our recommendation that the Emory program should be used as a base for the establishment of uniform junior college affiliated programs across the country to train the advanced technologist, not the routine one. It is our desire to see the Associate of Science degree awarded at the end of 24 months with an internship of six months following to achieve the 2400 hours of practicum.

3. It is our recommendation that special effort should be made to recall as many "retired" technologists as possible to fill the current demands of the field. Possible, federal grants could be

made available to hospitals to offer three month intensive refresher courses to enable these people to return to the field.

4. We believe that certification and licensure are potential obstacles to the success of any educational program. An educational program must be geared to equip the student to pass a licensure examination and thereby practice his art or profession. We do not believe, however, that all students or people professing to be technologists can necessarily pass such an examination. We do recommend state licensure, but only if the examination is such that the student must possess the minimum standards of the typical hospital school graduate or the typical Emory graduate to pass the examination. We further recommend that only past graduates of AMA-approved schools be "grandfathered."

In regard to certification, it must be remembered that certification should mean more than licensure. Certification in our opinion is the mark of a professional technologist and should not be affected by any state licensure. Controversial as it is, we must recommend that the certification examination not be offered at the completion of training as is the current practice. Instead we recommend that for eligibility to take the certification examination the technologist must satisfy three requirements:

Be a member of the ASRT

Be a graduate of an AMA approved school,

Have completed some specified number of years of competent work in the field of x-ray technology.

PLACING PROFICIENCY MEASUREMENT IN PERSPECTIVE IN RADIOLOGIC TECHNOLOGY TRAINING

Special Resource Speaker: William A. McClelland, Ph.D.
Vice President
Human Resources Research Organization

A recent issue of the Carnegie Quarterly was devoted to a report on certain innovative medical and allied health profession and science programs. It contained a very important sentence about today's crucial problem in the delivery of health care. "Neither the resources of new technology nor the insights of the social and behavioral sciences have been fully brought to bear on medical systems and patient care." Of course, inclusion of the phrase "fully brought to bear" almost guarantees the statement is true.

It is my intent to suggest a perspective on the assessment of proficiency which if applied in both didactic and practicum training should facilitate the delivery of better trained manpower in radiologic technology. Before I do so, however, let me attempt to establish my credibility, or more accurately state the experience and reputation of the organization for which I speak. The Human Resources Research Organization, or HumRRO for short, has been concerned with research and development on ways to improve human performance since 1951. For the first 18 years of our existence we were a part of nearby George Washington University and worked largely for the Department of the Army doing educational and training research studies. The students or trainees that we have studied are dissimilar to typical candidates for radiologic technologist primarily in the ratio of males to females.

Today HumRRO has worked or is working for well over two dozen sponsoring organizations including federal, State and local governments, industry and a variety of educational institutions. Over the years HumRRO has made substantial contributions to educational and training technology, and notably has pioneered the development and test of a systems approach to the construction of training courses. It is from the systems perspective I wish to speak today. The systems perspective is undoubtedly familiar to you who are concerned with curriculum development and revision. It is my contention that this perspective is clearly relevant to the purposes of this conference.

Study of the pre-conference materials has convinced me that there are many persuasive parallels between the goals and methods of educational programs in radiologic technology and those of the technical training programs on which HumRRO has worked. Let me list a few.

Both have been concerned with technical training for the acquisition of knowledge and rather complex skills which are new to the beginning students.

Commonly, the students are in their late teens and early twenties.

Both require formal or more academic training together with considerable practical or "hands-on" experience.

Both kinds of programs must operate within administrative constraints such as general prescription of content by agencies or associations; cost and course length consideration; occasional shortages of qualified instructors; the need for graduates to meet specified proficiency standards; and a rate of job turn-over which may be too high and often inadequate facilities.

Simulation techniques are used by both for some tasks, often because of safety considerations.

Both have been concerned with such longer term matters as career possibilities, combating technological obsolescence and assuring continued effective performance on the job.

Although it is only one aspect of the larger matter of developing and administering a relevant curriculum, the topic of proficiency examination in the curriculum serves as an excellent departure point for the remainder of my remarks. Proficiency examinations, as you well know, can serve several purposes:

to monitor the quality of training,

to diagnose instructional difficulties,

to permit ranking the students according to accomplishment,

In short, proficiency examinations are part of a quality control system which exists to support training.

Most students of such information systems agree that a quality control system includes concepts, models and procedures which function to organize or integrate four main objectives:

quality assurance,

control of student progress,

training program improvement, and

training system diagnosis and change.

Quality assurance? We need to know if graduates can meet the performance specifications. Some specifications are administrative. Some specifications require the use of proficiency criteria.

Control of student progress? "The quality control system should provide a means of selecting and organizing the learning experiences of students so as to facilitate achievement of the learning objectives." Each segment of the course is designed to help students meet specified learning objectives. "Decision options will vary from one training system to another, but they would generally include those of sending the student forward to the next segment of the course, recycling, or giving special corrective training. Generating information on the basis of which choice among such options can be made is a function of the quality control system." So much for the progress of the individual students.

Program improvement? Is the training program acceptable? If not, how can it be improved? By assessing and diagnosing the performance of the trainees one can best identify weaknesses in the program.

System diagnosis? No training program operates in a vacuum. It interfaces with many other systems such as those of the subject matter disciplines involved, those of feeder school systems and cooperating hospitals, those of accrediting organizations, and last but not least those of the employers of the graduates. There have been and there will continue to be stresses and strains, accommodations and compromises among these interacting systems, and they affect the training system. Understanding and resolution of the problems which inevitably must arise should be facilitated by adequate quality control information.

I have spoken so far about the main objectives of a quality control system. But what are its essential elements? HumRRO research in educational and training technology has identified six. We have found them to be essential whether the speciality for which training is given is electronic equipment maintenance or piloting a helicopter, serving as a cook or as a medical corpsman, developing proficiency in a foreign language or becoming a tumor registry technician. These six elements are:

1. Training objectives. Without well-defined training objectives there can be no meaningful quality control system. They lie at the very heart of the perspective I advocate. Ideally, the statement of training objectives would be in terms of performance capabilities needed on the actual job. Only by reference to such objectives can assessment be made of the proficiency of the students

and of the adequacy of the training system.

2. Proficiency and diagnostic measures. As noted earlier tests and measures are an essential element of a quality control system. However, by themselves they do not make a quality control system. Both in-course progress (or achievement) tests and diagnostic tests are required, for they serve somewhat different functions. With relevant and meaningful training objectives training managers can concern themselves with absolute criteria. Do the students' grades and test scores indicate the learning segments have been mastered? With carefully specified training objectives it is no longer necessary to seek refuge in relative criteria, i.e., comparing how much student Susie Smith knows as compared with student Jean Jones.

3. Data reduction and analysis. In and of themselves test scores and grades have little meaning. Such data must be analyzed and interpreted. How the data obtained from proficiency and diagnostic measures are treated depends on what information is needed, by whom, in what form, and to support what decisions about individual students and improvement of the program.

4. Communication procedures. They are needed so that training system managers will be assured that the relevant information is made available to the responsible person or persons in order that timely decisions can be made.

5. Procedures for corrective action. A quality control system must make provision for those corrective actions indicated by analysis of the test data. Procedures must be specified by which decisions are made and means of assigning responsibility for the implementing actions selected.

6. Managerial support. All supervisory levels must provide strong managerial support if the quality control system is to be effective. Such a commitment requires that all training staff members understand the rationale and the workings of the quality control system.

If the training system is large enough, ideally quality control functions would be performed by a unit separate from that charged with executing the instructional mission. The directing radiologist or head of the entire program would, of course, perform over-all supervision of the quality control function.

I think you can see that the information and data provided through the proper exercise of the quality control function could result in some unpleasantness among staff members. Support from management is thus of considerable importance when some inadequacy in the training program is revealed. In point of fact, no one should be happy about such a revelation, but neither should he be surprised. No training program can perfectly prepare the graduate for 100% performance. And, few jobs are so static that their functions and tasks never change. So, of course, information about how to improve the program or the training of any given student is bound to come to light through the workings of a quality control system.

A special word on performance feedback in a quality control system is indicated. Feedback must be provided both during training and subsequently from the job contexts in which graduate radiologic technologists are employed. Most training programs gather data on how well students are performing during training, although they usually do not make such determinations on the basis of student mastery of training objectives. Very few training programs in any setting obtain good feedback on how well their graduates perform the tasks required on the job. Yet we know that new administrative procedures, new techniques and new equipment do change the job of the radiologic technologist. Training objectives, therefore, must be adapted to be responsive to such changes. Relatively speaking, we usually know a lot about such input and training variables as student characteristics, accreditation requirements, and course staff and facilities. But we are usually quite poorly informed about the output side of the situation, specifically how well the graduates perform and what happens to their proficiency over time.

The development of a quality control system may seem to be a very formidable task. Viewed, however, from the perspective of a systems engineered training program quality control is really inseparable from the training itself. If the goal of the training system is assuring that a well-trained graduate is the product and that improvement of training is a goal to which the institution is committed, a quality control system is essential.

My own evaluation of the prospects for improved training of radiologic technologists, while based on admittedly incomplete information, is optimistic. Why? For these reasons:

1. The educational trend appears to be locating more and more of the academic portion of radiologic technologist training in two year colleges. My knowledge of such institutions convinces me they are the real and spirited leaders in training innovations, truly the "now colleges" to borrow an AAJC term. Both the resources and the energy of the two year college are impressive. So is their willingness to serve community needs.

2. Reports on similar conferences and the serious development of job descriptions and career ladders in the radiologic technologist area represent a fine beginning.

3. The fact of the present conference shows a continuing interest in and dedication to effecting those systemic changes which can achieve the purposes of quality control.

4. Finally, the technology exists to effect a working quality control system, and published reports are available on how such systems have been developed and operate.

CURRICULUM WORKSHOP REPORT

The Curriculum Workshop was convened to consider the didactic work provided by the college and the practicum offered by the affiliating hospital to deal with

established essentials,

curriculum development,

facility requirements,

the proficiency of the graduates.

In order to accomplish this, the workshop was divided into sub-groups and given the following charges:

To recommend a research proposal (long range) for the development of performance criteria and measurement devices for staff radiologic technologists (appendix); to suggest a committee mechanism for overseeing the development and implementation of the long range research proposal; to suggest an interim approach to curriculum development for the purpose of offering possible modifications.

To recommend those learning modules for the curriculum which are pertinent to all allied health fields.

I. Research Proposal and Interim Recommendations

At present there are inadequate procedures for evaluating the practical competency of recent graduates of radiologic technology educational programs. Furthermore, it is apparent that certain decisions regarding practical (clinical) course length and content await the development of assessment procedures. To provide a means for undertaking this development of proficiency assessment devices and procedures, the following strategy is suggested:

A. Funding should be obtained to finance the activities of of a steering committee made up of three representatives from each of the following organizations:

1. American Society of Radiologic Technologists,

2. American College of Radiology,

3. American Association of Junior Colleges,

4. Association of Schools of Allied Health Professions,

5. U. S. Department of Health, Education and Welfare,

6. American Association of Physicists in Medicine (one representative)

It is recommended that representatives from the ASRT and ACR be currently involved with college affiliated programs in radiologic technology and have had experience with hospital based programs.

B. Since the task of this steering committee is basically an administrative one, it should utilize whatever special resource people deemed essential to facilitate both long range goals and interim proposals, descriptions of which follow:

1. Interim Proposal - Because the suggested long range study will require considerable time to effect, and because there seems to be an urgent need to assist emerging college affiliated programs in radiologic technology, it is suggested that this same committee be funded to gather significant data from existing college affiliated programs - i.e., curriculum patterns and content, administrative techniques and nature of clinical time and experience - with a view to temporarily modifying existing curriculum guidelines if necessary. If the existing curriculum guidelines are modified in this interim period, it is suggested that on-site visits be made to selected college affiliated programs which might have influenced those changes. Findings derived from this interim study should be available as reference to those agencies and institutions seeking advice and assistance. It is recommended that this project should not exceed six months from date of funding, and that funding efforts be expedited immediately.
2. Long range goals - Develop task analyses based on the job descriptions already prepared (see appendix). From these task analyses (which would result from the proposal outlined in the appendix), curriculum recommendations should ultimately derive. These latter should be commensurate with other technical and occupational curriculum patterns in two year colleges: i.e., they should demonstrate:

   a. Technical component - courses which are specific and unique to radiologic technology.

   b. Related science component - courses which usually derive from one or a combination of the science disciplines - physical, natural, social and behavioral.

c. General education component - courses in language arts, mathematics, fine arts, social studies and physical education.

Incorporated in the technical components of the curriculum are the necessary laboratory and clinical experiences. The committee should give particular attention to applying the task analyses - and concomitant findings - in modifying only the technical and related science portions of the curriculum. The committee should be charged with publishing their findings and establishing procedures for distribution to interested parties.

3. Concluding Steering Committee Responsibility - On the basis of data obtained from the long range task analysis, the steering committee will study recommended final revisions of curriculum guidelines.

II. Current Curriculum Content

Though it is uncertain at this time what the total length of the program shall be and what will ultimately comprise the curriculum content - and until both the interim and long range study recommendations are received - it is suggested that the current AMA Council on Medical Education curriculum guidelines be utilized for radiologic technology program development.

Conclusion

The curriculum committee has struggled valiantly with the charge of producing curriculum guidelines for the structuring of course offerings for radiologic technologists in two year colleges. Our efforts, partially successful, were impeded by the enormity of the task technically, the shortness of time available, and the size of the group. Moreover, there appeared to be some difficulty among the participants to communicate with each other.

Despite these difficulties the group did strive to remain faithful to the task and provided two mutually supportive long-range proposals: First, to set up a professionally respectable ad hoc committee to develop interim curriculum proposals. This steering committee would assist in securing funds to be initially directed toward the scientific identification of criteria for assessing effective radiologic technologist performance. The securing of these criteria for measurement will involve detailed task analyses.

It is data and understanding from the task analysis process which will provide the basis for scientific curriculum organization and learning modules. These criteria will then be utilized as indicators of the level of competence to be developed through radiologic technology educational programs and also possibly indicate appropriateness of current utilization patterns of such practitioners.

Unresolved Questions

Is the current practicum methodology and length appropriate?

Are job descriptions adequate and/or appropriate?

What really is the effectiveness of the current finished products?

What are reasonable educational equivalency tests and criteria for use in granting formal radiologic technologists' credentials?

APPENDIX

I. Introduction

The Test Development Subcommittee of the Curriculum Workshop was given the following charge: to describe the contents of a proposal for a research study which would:

A. Establish objective criteria for measuring the degree to which recent graduates of hospital-based or college-based radiologic technologists' educational programs can perform in accordance with minimum job performance standards established for the job position of staff radiologic technologists;

B. Develop and validate a proficiency test based on these criteria;

C. Develop the procedures for administering this test;

D. Employ standard behavioral analytic procedures for task analysis, identification of minimum performance standards and translation of these standards into valid test items.

II. Research Objective

The objective of the project proposal is to develop and validate a proficiency test which can be used to assess the skills of persons who have completed a hospital based, college based training program for staff radiologic technologists.

III. It is suggested that the proposed project be conducted in accordance with the below listed general recommendations:

A. Sources of Information

1. To prevent duplication of past and present efforts, it is recommended that a search be made of past and present work which has developed information which describes job duties, job standards, curricula formats and pertinent experimental projects.

2. Assess and analyze trends and technological modifications as a basis for developing on-going curriculum change procedures.

B. Data Derived from Task Analysis of the Staff Radiologic Technologist Job Position

1. It is recommended that the staff radiologic technologist job description as developed by the American Society of Radiologic Technologists and American College of Radiology (1/1/69), serve as the basis for developing specific data regarding the tasks, skills, knowledge and performance standard requirements to be incorporated into the proposed proficiency exam. The major activities involved in this task analysis should include:

a. the development of a detailed task inventory for each of activities listed on the A.S.R.T. job description.

b. a determination of the relative importance or job-criticality of each task. This data to be used to determine the core test items of the proficiency test.

c. a specification of the minimim standards of performance for each task listed on this job inventory.

d. a specification for each task of the enabling knowledges and skills and attitudes associated with that task.

e. for each task, a recommendation regarding when in the teaching sequence that task should be taught and whether it should be part of the didactic instruction, practicum or both.

C. Test Item Characteristics

1. Test items should be developed in accordance with the following recommendations:

   a. Each test item should bear a clear relationship to a job activity. Emphasis should be on the development of performance test items which directly assess the capability to perform job related tasks.

   b. Test items which assess the existence of enabling knowledges and skills are acceptable when the application of these skills and knowledges in the job setting cannot be assessed directly.

   c. Attitude assessment. It is important to assess radiologic technologist attitudes as they relate to acceptable handling of the patient. The development of attitude assessment procedures should be based on:

      (1) An identification of those behaviors which serve as indices of acceptable attitudes.

      (2) The development of suggested procedures for assessing attitudes within the instructional setting. This should include development of assessment devices (checklists?) which can be used by an instructor while observing the student.

   d. Pass-fail Scoring Procedures. Test items should be scored on the basis of whether or not the student responds to the item in a minimally acceptable fashion. Minimum standards for correctly answering a test item must be related to minimum standards of job performance.

   e. The total test should consist of:

(1) A sub-test of core items dealing with highly critical job tasks. All students should correctly answer approximately 95% of these items.

(2) One or more other sub-tests containing a sample of test items. The composition of this sample could vary - the same items need not be administered to all students.

(3) Variable test item format. Multiple-choice essay and other test item formats are acceptable so long as specific scoring guidelines are provided for non-objective types of test items.

D. Administrative Procedures

The procedures for test administration should be carefully field tested and described in a "Test Administration" handbook. The procedures should be capable of being followed by instructors and/or administrative personnel associated with either college or hospital based radiologic technologist educational programs. Realizing that this may raise administrative problems, an investigation should be made of the conditions under which it would be feasible to administer performance tests at the educational institute, at a regional or a central site. In addition, recommendations should be developed regarding:

1. The applicability of the test for local, state and national use and especially for licensure purposes.

2. The institutions and/or agencies which should be charged with test development revision, test security, test scoring, etc.

E. Suggested Uses of Proficiency Test

The proposed test would serve as the basis for a quality control system.

1. In addition to providing a means for the standard assessment of educational program products, the test would provide a means for assessing techniques, varying course lengths and the need for certain types of course content.

2. The task analytic data developed would provide a basis for reexamining educational objectives, job position structure, the adequacy of existing performance standards and present time standards applied to total technologist education.

F. Project Time and Cost Estimate

In the absence of a detailed research proposal, the following estimate must be viewed as very tentative.

1. Time estimate: Three years to complete project assuming commencement on July 1, 1971 and assuming approximately six professional man years of effort per year.

2. Cost estimate: Approximately two hundred thousand dollars ($200,000) per year.

G. Characteristics of Research Teams

1. Steering Committee: Members selected from:

    a. American Society of Radiologic Technologists

    b. American College of Radiology

    c. American Association of Junior Colleges

    d. Association of Schools of Allied Health Professions

    e. U. S. Department of Health, Education and Welfare

    f. American Association of Physicists in Medicine

2. Research Team: Should be a combination of behavioral scientists experienced at test development and validation plus representative technologists, radiologists, etc., involved in the education and utilization of staff radiological technologists.
Prime contractor should be a non-interested party as regards the profession of, and education of, radiologic technologists.

ADMINISTRATION WORKSHOP

Administration related to the required physical facilities and needed financial support plus faculty considerations, intra-mural relationships and reevaluation of existing programs.

ADMINISTRATION WORKSHOP

Workshop Moderator	McCune, Shirley D., Ph.D. Associate Director American Association of University Women
Overview Speaker	Caffrey, John G., Ph.D., President Educational Systems Research Group
Reactors	Snead, Claude R., M.D. El Camino Hospital
	Stevens, Matthew, R.T., Director Radiologic Technology Department Northeastern University
	Wilson, Richard E., Ph.D, Acting Associate Director American Association of Junior Colleges
Special Resource Speakers	Marshall, Dwight, Dean College of Allied Health Professions University of Nevada at Las Vegas
	Powers, Helen K. (no formal presentation) U.S. Office of Education
Recorders (Bureau of Radiological Health Personnel)	
	Froom, Charles, Chief Rockville Training Section
	Bunge, Ralph, Instructor Rockville Training Section

Other Workshop Participants:

Mr. Michael Audet
Dr. Nathaniel Barrish
Dr. Donald Beatty
Sister Dorothea Burkard
Mr. Robert Coyle
Dr. C. Larry Crabtree
Dr. Oliver H. Duggins
Mr. Richard Gilbert
Dr. Roy J. Harvey
Mr. Scott Neville
Mr. Royce Osburn
Mr. Robert Owens
Miss Gertrude Pearson
Mr. James Peterson
Sister LaVerne Ramaeker
Mr. William Samuels
Dr. Joseph R. Scruggs
Dr. J. Pat Steele
Mr. John C. Villforth

OVERVIEW SPEAKER
Administration Workshop

Overview Speaker: John G. Caffrey, Ph.D.
President
Educational Systems Research Group

Academicians responsible for as much as they can control of the establishment become rather hypnotized by some of their problems. But we are still afraid to talk about certain problems; we don't like to face up to them; we are not willing to be candid, because there is a tradition in the academic world that a gentleman (or a lady) "doesn't do" certain things.

One taboo that I think is beginning to slip a little is the one which labels "management" a dirty word. It's not a four letter word but it has all the implications. When I first joined the American Council on Education staff in 1966, I used to talk about academic, "management," and people would wince and say: "Don't say 'management,' John, say 'administration,' say 'governance'."

As recently as last spring, at a seminar in Atlanta, I heard a college administrator say that "management has no place in higher education." The word "management" has no accepted place in higher education. I think there is a value in using the word just as there is a value in facing up to anxieties, problems and superstitions. When I use the word "management," I am talking about techniques of making complex systems work; it is a matter of division of labor. When you go camping, someone has to gather the firewood, someone makes the meals, someone catches the fish, everybody does a little something, but everybody doesn't do what everybody else is also doing.

I understand that when the word administration appears, the manager is a mediator; he is a facilitator; he makes leadership possible. He may not himself be a leader. It's possible to have a very good manager who is not himself the leader (in the mystical sense of a leader who is one who creates goals, persuades people to pursue goals, inspires them to agree on goals). That seems to me to be a principal function of leadership. I have worked in organizations (undoubtedly all of us have) in which the top man had a great vision, got everybody fired up, got people to work hard on nights and weekends, but was a poor manager who nevertheless had a good second officer who kept the ship going. If it hadn't been for the second man, the place would have come apart - and vice-versa. I have also known a top man who was a complete deadhead. He had no ideas of his own but appreciated the bright younger people and pushed them, gave them all kinds of opportunity and all lengths of rope.

There is no such thing as an ideal organization. It all depends on the people in the situation - the personal chemistry of the people on board. Once I interviewed Bruce Partridge, now President of the University of Victoria, British Columbia, then at Johns Hopkins. I asked him, "Where is the ideal place to put the computer center man? He said, "There is no ideal place. To put it another way, this year I might put him under the business manager because I think the computer center is rather sloppy in its business management; next year I might put him under the dean of engineering, because there is not much scientific strength in the computer center; the year after that, I might put him under the librarian because we need to be more information-system oriented." Partridge's point is very true. The way we organize people has to be, to a certain extent, psychological. I recently took some notes from The Human Side of Enterprise, a book by Douglas McGregor (McGraw-Hill, 1960). It is one of those books that you wouldn't find at a higher education library because it is about management; but there is profound truth in it. McGregor, who at one time in his life apparently studied a little psychology, is talking about the fact that it's getting to be possible to become a professional in the field of management. He said, "Today's manager can draw upon a reasonable and growing body of knowledge in the social sciences as an aid to achieving his managerial objectives. He need not rely exclusively on personal experience and observation. Every managerial act rests on assumptions, generalizations and hypotheses, i.e., to say every managerial act rests on a theory. Our assumptions are frequently implicit, sometimes quite unconscious. Often they conflict. When we fail to achieve the results that we desire, we tend to seek the cause everywhere but where it lies: in our choice of an appropriate method."

All managerial decisions and actions rest on assumptions about behavior; the point of this quotation is that all of the social and behavioral sciences have contributed something to our understanding of administration today. They have also contributed something to our confusion as well.

We can also learn from history. For example, there is a fascinatingly funny but also profoundly wise book by Antony Jay, Management and Machiavelli. He dips back into history to see what we can learn by reformulating Machiavelli's analysis in terms of the corporate officers instead of kings and prime ministers. In collegiate terms, the president is the prince, and deans correspond to the barons out in the field. In this very funny book he draws upon historical parallels to show us in very telling ways how bad management can be and how much we can learn from history. He even uses mythology. He says that King Lear was undoubtedly one of the worst managers of all time. He didn't know how to delegate authority; if we start thinking about King Lear in terms of the management game, it's hilarious. In effect, he says that a little delegation is a good thing, but when you give away the whole game, don't wonder if you get yourself into deep trouble. Richard the Lion Hearted was a splendid and charismatic soldier as long as he stayed away from home. But when he got home, he always got into trouble, because he didn't know the first thing about management. The analogy he draws is that we reward a fine teacher by making him a dean and then when he gets to be a dean he is a miserable administrator.

This brings us to the Peter Principle, next entry in this reading list. I think The Peter Principle along with Parkinson's Law deserves a place on every manager's bookshelf of classics. It's a mine of ideas and insights. If you overlooked it as being "light," don't.

We can learn something, believe it or not, from schools of business administration, who, by and large, in my view, do a good job of turning out people who know how to run businesses better than amateurs do. We can learn from the study of law. Here on my reading list is not a book but an essay in the Encyclopedia of Social Sciences on "Legitimacy," a profound essay. We are facing a crisis, in colleges and universities today, as in the whole society, about what it means to be a legitimate authority. How does someone have the right to tell me what to do? For example, Cicero first pointed out that the state can have two kinds of enemies, a legitimate enemy and an illegitimate enemy. The Romans even had a phrase, "an enemy by law and by right." The legitimate enemy was, for example, another nation at war with Rome; but an illegitimate enemy was a pirate who is not an enemy by law and by right, but an outlaw. This distinction is, I think, fundamental at present in the United States, particularly on some college campuses where we uneasily separate pirates from honest enemies of the system. Obviously, we've drawn a great many lessons from psychology about behavior. All managers, even the most naive and extroverted backslappers, have a theory about human behavior, about how you get people to do things. His theory may be all wrong, but he has a theory. There is, for example, the theory that people are naturally lazy and that if you don't keep after them all the time they will sit and do nothing vs. the theory that people take great pride in achievement and if you just give them the tools and show them how and point them in the right direction, they'll do fine on their own and don't have to be supervised. Each has its proponents: I have worked for both kinds, and so have you. I find the discipline of anthropology an interesting model in thinking about administration. If you think about the special cultures, in the anthropological sense, that exist on college campuses - and in the world of administration you can make a kind of "anthropoligists anonymous" analysis of how the administration is regarded in other cultures on the campus by the student culture; by the faculty culture. Myths grow around the administration, including methods of indoctrination, initiation rights, cabals, mystic inner circles. You can find all the elements of a primitive tribe on an ivy-league campus.

Above all, we have to look at administrative problems with a sense of humor. We are much concerned with managerial ideology; the whole question of legitimacy, for example, is basic. We need to talk about it, to face up to the fact that we live in a culture which puts a great deal of emphasis on common consent and also sees great value in tradition. Believe it or not, one of the best reasons for continuing to do something is because that's the way we have always done it. This is the modern version of "hereditary" legitimacy. It is not that it goes from father to son but it goes from Dean to Dean; not by bloodlines but by indoctrination and by the opening and shutting of the flood gates that keep some people out and let other people in. We are a meritocratic lot, by and large, in the academic group, in the sense that we are willing to recognize merit; that people who have outstanding merit ought to rise. But on the other hand, it is absolutely death to a young man if he says he wants to be a college president someday; he might as well give up. You must never say that you want to be an academic administrator; it is just absolutely not done. You might aspire secretly to be a college president, but don't say so. Don't ever take a course in administration, because that might confess your ambition. A man who says he wants to be a college president thereby disqualifies himself instantly.

I think the concept of management, however, is beginning to widen. We're beginning to have a quiet little revolution. In 1966, Francis Rourke and Glenn Brook published The Managerial Revolution in Higher Education, a book I recommend to you even though it was published four years ago. I once told Rourke that he really should have subtitled the book, "The Unicorn in the Garden" because the real joke about the book entitled "The Managerial Revolution in Higher Education" is that there isn't one; that is, it hasn't happened yet. That's the joke in the book, but you have to read the whole thing in order to find it.

The manager, it seems to me, has the function of freeing and not restraining. There are two basic styles in administration, the conservatives and the liberal but not in the political sense. To me a conservative never does anything that doesn't have to be done nor does he let you do anything that doesn't have to be done. The liberal view of administration is to liberalize constraints as much as possible to give everybody the greatest possible freedom but also to be realistic about the constraints. By constraints, I mean, for example, where the walls and doors are, how much money we have, how old you are, and how the public feels. You may try to change some of these constraints, but the administrator teaches people to live within the constraints, makes as few constraints as possible, makes it as clear as possible not only what the goals are but also how the goals are being formulated.

One of the hardest things to get the feel for when you go into a new organization is how the goals are set, who really calls the shots. I think the administrator should make these things very explicit. This is as a teacher. It is my view that an administrator is also a teacher and counselor. There are times when you have to fire people and say no, but then everyone has comething wrong with his job.

I will suggest five ways of describing the style of an administrator, five variables that I think every administrator should think about in trying to describe or determine his own style.

The first one (I learned this from Peter Drucker) is: how he spends his time. What does he do during a week or a day? Mr. Drucker's famous for having proposed this idea, and it is absolutely true. You know the old saying that there are only twenty-four hours in a day. Mr. Drucker says that's not true. There are, at most, one or two - for most administrators. The rest of the time is spent doing not what you want to do but what someone else wants to do. You are answering letters, answering the telephone, going to meetings, going to conferences. A young man who is now the Vice-President of a university once came to me when faculty dean of the same institution and said, "You are supposed to know something about administration. I'm dying; my desk is covered with mounds three feet high and I can't even find the space to write a note on because there is so much in my in box. How did I get into this mess and how do I get out of it?"

I told him to read Peter Drucker. The essential point of the book is: Everything that you don't have to do, don't do. As a manager, your job is not to do things but to see that they are done. If you had to go to the hospital, and you came back six months later and went through some of that pile, you would find that half of it doesn't matter anyway and the rest was taken care of by someone else. Most managers kill themselves early and get heart attacks because they think they, and only they, and nobody else can do it as well as they can. So how do you spend your time? Take a good look at it. If you are a good manager, how many hours a day do you spend your time on creative leadership, thinking about the future rather than taking care of something which someone else could probably take care of for you. (If not, fire him and get someone who can.) As Anthony Jay says, the job of the top man is to watch the tide and not the waves.

The second style element is how you use people. Are you willing to use them as errand boys, or do you try to find the best in them? You may have a very cranky, disagreeable character but he is a genius at accounting. How do you use him? I think you spot a man's style in the way his staff speaks of him. Is everybody a spoke separate from the wheel, or is there a real feeling that the whole group functions as a unit? Does he tend to talk down to people? Does he tend to consult people? Does he have any respect for people?

Third, how does he use information? How much does he get? Does he really write on a basis of information? How does he get it? Does he get it from cronies? Does he get it from reports? Does he seem to get it from intuition? How do you make him go? How do you turn him on? What kind of data do you give him? Some men are convinced only by numbers. If you give him dollars and cents accounts, then you have done your homework. Other people are interested only in information in the sense - Well, how are other people going to feel about it? What's that going to do to our image; what kind of information does the man use and how do you use it? Do you seek it out? Does he ask for information or does he wait until you bring it to him?

Fourth, (important in every institution), how does he feel about money? Is money a tool, is it an object in itself, is it a tool for getting things done? Or is it something to be conserved as inherently good and not to be spent unless necessary? Does he use money to bribe people to get something started here or to discourage something there?

Finally, and an important variable (probably the most vague): How does he work with ideas? Does he propagate ideas himself; have a lot of ideas and expect you to cut them down to the practical ones? Or is he very selective - has no ideas of his own but is very open to new ideas? Does he listen to you, consult other people (to be pleasant) - or does he really resent ideas? Some of you may have known or worked for people who are only interested in ideas if that idea would make this person greater in his own eyes or in someone else's. If it didn't mean anything to him, then it is of no interest.

I invite you to examine yourself and examine the people you work for in the light of some of those notions.

We now face in education a great crisis of resource allocation. We have too little of too many things: too few dollars to achieve certain purposes; too few people in certain professions; too few jobs for some people. The administrator will always lead sort of an agonized battle to surmount this environment. Infinite though it may be in some respects, it is always a closed circle in any given segment. There is a finite pie of money: "This is what we have this fiscal year. Now we are going to cut it this way: The behavioral sciences get this much; the library gets this much; the computers get this much, etc. after this pie has been divided, there isn't any more. If you are going to increase the library, which one of the other boys is going to give up his piece?"

That's the continual war. We can cut by program and ask, if we increase counseling, how are we to cut instruction? A decrease in instruction means: Are we going to have larger classes or, if we don't want larger class sizes, are we going to keep more students out? Something has to give. You are always juggling parts of a finite set of something. The job of the top man is somehow to make the resource allocation process work and at the same time work for the goals of the organization and not cause these constraints to be a reason for not getting something done but rather convert constraints into things that move us forward.

Another book on my reading list, University Goals and Academic Power, (paperback, by Gross and Grambsch, published by the American Council on Education, 1968) is a study based on 1965 data that is irrelevent. The book gets right to the heart of the distinction between ultimate goals and intermediate goals. Foe examp e, the object of the intermediate goal of the librarian might be to make sure that every book is properly placed on the shelf, while the ultimate goal of learning (using the library as a learning tool) is somebody else's goal. The man who makes rivets has, as his object, the making of the best rivets in the world. The fact that the rivets are going to be used to put into a boiler (the ultimate goal of the organization) is what causes so much bureaucratic conflict and the fuming passions within any organization. Gross and Grambsch analyze the difference and suggest useful ways of thinking about goals.

My final prediction is that the most important tool for the manager in this century will not be the computer (although the computer is necessary) but the technique of simulation of the educational system. Simulation implies the process of asking, what would happen if we changed the pupil-teacher ratio? What would happen if we cut out the major in theology? What would happen if we raised our tuition by $50? What would that do to income, enrollment, costs?

Simulation has always been a technique of managers. However, the human brain can only handle a very small number of variables at one time. It can't solve problems involving all those variables, all those pupils, all those rooms, all those dollars, faculty, trustees, alumni, citizens and everything else at once. The administrator who survived has been the one who made the best guesses. But now with the simulation capacity of the computer, we can talk about equations with 500 variables, some not even linear. The administrator can ask the computer, What will it do to us ten years from now if we increase the tuition $50 every year? What will it do to us in terms of productivity of B.A.'s if we increase class size from 25 to 30 starting next year? What will it do to our staffing problem, to our space ratios?

Initially we started out developing this capability in order to do planning. Simulation was invented so that people could plan, could make budgets. But now we have learned that simulation can become a daily technique; that we don't have to live with a budget forever just because it is so hard to make one. Now we can rebudget every week or month. Simulation is a technique of management that changes the way that people behave when they know they have this capacity to ask "what if?" questions of unimaginable complexity and get the answer in a few minutes. It just changes the style of administration although not only in planning.

Reactor: Claude R. Snead, M.D., Chief Radiologist
El Camino Hospital

The trend toward Junior College involvement in training programs in radiologic technology has increased during the past 10 years. Three years ago there were eleven junior college related programs in radiologic technology in the State of California. At present, there are 22. A factor in the trend is the rapidly increasing hospital costs and the question as to the advisability of including hospital training programs and the cost of patient care. Government policy favors support of training programs as conducted by academic institutions rather than those conducted solely in hospitals.

During the early growth phase of junior college programs the curriculum has been difficult to establish. Guidelines are often vague and inconclusive. Duration of the clinical practicum has been a controversial problem and there is immediate need for establishment of guidelines as related to curriculum and to determination of length of the clinical practicum required to produce what is often described as a "working technician." The purpose of this presentation is to propose a curriculum and clinical practicum which based on actual experience over a 24 month period would adequately train a radiologic technologist; provide academic credits for transfer to institutions of higher learning and permit the possibility of lateral movement into related fields.

Since the course in radiologic technology was established at Foothill College in 1962; approximately 54 students have graduated. They received the A.A. degree and upon completion of the clinical practicum were examined by the American Registry of Radiologic Technologists. All passed the Registry with an average grade of approximately 89%. At present we have in our training program, 25 first year students, 15 second year students and 9 interns. The interns are in the 27th month of training. The current program in radiologic technology is of 30 months duration including 2500 plus hours of clinical practicum. Customarily in junior colleges, particularly in nursing and inhalation therapy programs a period of 24 months is considered adequate for training. Therefore, radiologic technology is competing against shorter programs of equal or greater potential remuneration. The prime consideration, however, is whether or not radiologic technologists can be trained within 24 months. Therefore, I will submit data suggesting that junior college hospital affiliated programs of 24 months is not only feasible but desirable. Students in our program at the end of September 1970 completed 24 months of the 30 month curriculum. Those students were asked to tabulate total procedures over the period of 24 months. These tabulations included only those which were unassisted. Each student performed more than 1000 procedures; some performed 3000 or 4000. There is explanation for the variability; however, the conservative figure of approximately 1500 was chosen for study. It is estimated that procedures during the 24 months were completed within 1550 hours of clinical practicum. You will note from tabulation that a wide variety of procedures was performed, however, overall experience suggests adequate exposure to general radiographic work. One may conclude from study of the tabulations that at the end of 24 months these students were capable of performing the usual radiographic procedures.

ENERGIZED ON-CAMPUS RADIOLOGICAL LABORATORY

An important factor in training students in a minimum length of time is the availability of an energized radiological laboratory on campus. Such a facility allows teaching and positioning without depending on the availability of a diagnostic unit within the busy clinical hospital environment. At present, approximately 90% of positioning in our program is taught on the energized unit on campus. The equipment on campus consists of a tilt table, spot device, overhead and under table tubes plus an automatic processor. The usual accessory equipment is available. We are searching, however, for a generous contributor to provide an image amplifier with T.V. system and tape recorder with sound. The installation is set-up for receiving television systems. One could use video tape for teaching positioning and related subjects. The use of such a system and programmed instruction is and has been clearly demonstrated in other fields. I am sure that such instruction would allow training of greater number of technicians in a shorter length of time without dependence on the clinical facility. Radiation experiments using measuring equipment, grids, screens, phantoms, etc., are easily accomplished in such an environment.

HOSPITAL AFFILIATION

Academically, Foothill College staff and facilities might accommodate up to 30 students. However, dispersing these students through clinical facilities required multiple institutions in order to provide adequate clinical exposure. Rotation through hospitals at 3 or 4 month intervals provides a variety of experience for the student and increases their adaptability to different types of equipment. Also, students gain confidence because of the adjustment required when rotating. In addition, employment opportunities are increased because the students are exposed to chief technicians and radiologists who are on constant search for the outstanding student. The disadvantages of rotation are minimal, however, they are limited to problems related to over-staffing and lack of interest on part of hospital staffs in teaching. However, the overall picture indicates that affiliation and rotation through the affiliated institutions are desirable.

STUDENT STIPENDS

Because of the prolonged internship and due to competition with hospital based programs, student stipends have been established. Our students receive a stipend during the final 12 months of a 30 month program. The amount of stipend often does not adequately compensate a student whose productivity often is as great and as accurate as a regular technician. Assuming that a 24 month junior college program is established, it is recommended that the student stipend be eliminated. Elimination of the student stipend would tend to create a learning situation rather than an on the job apprenticeship program. The students instead of repeating examinations up to 300 chests and 200 or 300 gastrointestinal studies might best spend their time practicing on the phantom or doing procedures that are limited in number requiring greater skill. In our institution, El Camino Hospital, student stipends during this fiscal year will amount to 12 or 13 thousand dollars. These funds could just as well be utilized in subsidizing fulltime in-hospital clinical instructors who would coordinate teaching and student activities. Students when on a stipend rotate through multiple institutions. Hospital and employee benefits vary in these institutions creating administrative problems. Elimination of the student stipend would at the same time eliminate some of these forms of harassment. We have found that during the final 6 months of our 30 month program the morale of students suffers considerably and motivation for learning decreases. The students feel that they are doing "something for nothing."

CORE CURRICULUM

The first year of a 2 year program in radiologic technology might better be entitled core curriculum in radiation technology. The course content of the curriculum could be arranged so that the student might receive basic exposure to radiation technology allowing him to transfer laterally at the end of the first year into nuclear medicine, radiation therapy technology or radiologic technology.

SUMMARY

A curriculum of 24 months duration in junior college related programs is proposed. 39 quarter units might be transferrable to institutions of higher learning. Student stipends could be eliminated, and funds ordinarily used to subsidize students might compensate fulltime clinical instructors in the hospital situation. Rather than using a ratio of students to R.T.'s as a criterion for number of students accepted, one might consider a ratio of clinical instructors to students as a criterion for a number of students accepted. The curriculum lends itself to development of core curriculum allowing lateral movement into related fields such as nuclear medicine, radiation therapy or radiologic technology.

Reactor: Matthew Stevens, R.T., Director, Radiologic Technology
Northeastern University

Apparently I am like Dr. Caffrey, somewhat confused, not about the same things since he indicated he was not knowledgeable about the qualifications of the persons in attendance and was therefore in somewhat of a quandary about preparing a talk. I am aware of the general qualifications of the persons invited and the divisions into specific challenge groups. It is because of this that my confusion arises. I was expecting the comments made in this section to relate to the suggested outline. As a reactor I arrived and expected to hear something said by the keynote speaker that would evoke a strong response from me.

As a participant at this conference, I find myself in somewhat of a quandary as we are to address ourselves to the educational problems facing or concerning technologists. I am a Registered Technologist actively engaged in education as a Professor at the University, Chairman and Director of the Radiologic Technology Department or Program. When I received the invitation to participate at this meeting and accepted, I was requested to be a reactor in the section on administration with specific areas of interest. I will confine my remarks to the suggested topic. First I must react rather mildly to Dr. Caffrey and his remarks about the term management and its reception at educational institutions. I agree with him and his statement that the term is detested around Colleges/Universities. At the risk of being ostracized, I feel that Universities/Colleges and Hospitals are perhaps the most inefficiently managed institutions in the world. If the business enterprises were conducted in the same manner,this country would be in serious economic and financial difficulties.

To refer to a remark made by Dr. Snead, I agree there are some Radiologists that are good administrators but I know very few. Most are good Radiologists but as administrators they are horrible. They are not educated as administrators and do not possess the experience, knowledge and exposure that managers and administrators have. Their expertise is medicine and the application of their knowledge in this field speaks for itself. This is not offered in the form of criticism for any of the above mentioned persons or organizations but as statements of fact.

The areas of concern for this group were 1) Physical Facilities. Viewing this from the University side, it is nearly always a problem. There appears to be an excess number of students in proportion to the available space. At this University we have clinical affiliations with fifty hospitals and a total capacity of 290 freshmen students per year. Utilizing the cooperative plan allows us to schedule the classrooms/laboratory facilities more efficiently. The attrition rate due to failures and change of interest by the students accounts for 15-20% of the total enrollment. Because the course offerings are designed and presented in the hope of accomplishing a variety of purposes, namely to provide adequate numbers of competent technologists within the required amount of time, and to provide the information at a college level and quality so the students may make a choice of their respective goals. The student may elect to stop upon completion of 24 months with a Certificate, complete an additional year for an Associate in Science degree or earn a Baccalaureate degree. Approximately 50% of the students elect to stop after 24 months at which time all requirements necessary for registration have been completed and credits have been earned for this portion. The remaining 50% or a large percent will continue for the additional length of time necessary to earn a degree.

Efforts are made to maintain each class size at a total of 30 students so each student will be recognized as an individual and to assist in obtaining the best possible understanding of the material presented. To maintain this class size requires manipulation and close scheduling of available space.

2) Intramural Relationships. Students enrolled in Radiologic Technology should be interrelated with other students on campus. Some subjects are basic to a variety of programs and can easily accommodate students from different specialities to a particular level. Once this level of proficiency has been reached then the students may separate into the more distinct courses dealing with their specialty. The association with students from other areas will aid in each specialty gaining an understanding about the other. Since total health care is the responsibility of all professions, it is important that they understand or be knowledgeable about each aspect and the role it assumes. By utilizing this approach it assists in effective utilization of classroom space and instructor time.

3) Financial Considerations. In addition to the preceding areas of space and intramural relationships it must be known if there will be an energized laboratory of x-ray equipment or merely simulated . Each will require additional space closely approximate but the cost differential will vary greatly. A simulated unit may operate electrically without producing ionizing radiation and be extremely useful in teaching radiographic positioning, understanding transformers, calibration and other component parts. It is not necessary to provide adequate shielding if this type of an arrangement is used. To operate an energized unit would require a specific minimum amount of lead being installed to provide adequate protection for students, staff and others. There are distinct advantages to having energized units but this also requires a processing system, film, solutions, film storage room and numerous other accessory items.

If the students are truly an integral part of the college, they will have access to the Biology and Physics Laboratories and this will not require additonal budgetary expenses for establishing them. In these laboratories there should be adequate materials for each three students. Audio visual aids should be accessible and available in sufficient quantities. Classrooms should be well lighted and adequately ventilated. I think there is perhaps nothing more distressing to students than to be in a Classroom/Laboratory closely approximating a mausoleum. Students should be relaxed and comfortable and treated as individuals rather than as only a group of students.

To operate efficiently and effectively one must have access to sufficient funds to obtain the required materials and the most necessary. The availability of adequate funds is always a problem and being in the position of administrator or if you are a manager, budgets always present a problem. The average college or university, especially a privately endowed university such as I am employed at has little or no extra funds available and rely strictly on income generated as a result of tuition. This creates a problem since to operate with the ability to provide the necessary equipment, (audio visual, laboratory, etc.) the tuition becomes so exorbitant that it is difficult to attract the calibre of students desired. If funds were available to assist in defraying costs that are fixed and providing assistance for needy students, it would be a valuable aid in keeping tuition costs down.

Since we are not educating personnel for direct entry into industry, it is somewhat difficult to approach them for financial assistance. Industry as a total has a variety of grants, awards available but most are awarded to programs having a direct relationship to the particular industry. We know that industry benefits indirectly in all cases since a healthy employee will appear for work and one that is ill will receive benefits of the health professions and be recovered and back to work at a faster pace.

The only avenue presently available is the federal government. We cannot turn to the hospitals for direct financial assistance since they are presently financially overburdened. As non profit institutions, and allow me to emphasize "non profit", hospitals do not have the funds to underwrite the cost of education.

Dr. Snead alluded to the stipends students receive and suggested that any funds presently expended as stipends be placed into an education fund for obtaining and employing competent clinical instructors. I agree with Dr. Snead and I believe that radiologists as a group will support this concept. I further believe that the Departments of Radiology would not oppose underwriting the educational costs incurred by the student as another alternative to replace stipends. Education is and should remain the primary function of schools, colleges and universities and hospitals the provisions of excellent health care. Patients who are also taxpayers are presently overburdened with and by taxation and should not be expected to contribute to education via taxation and as part of their medical costs.

Even if the funding is obtained from the federal government, funds will be obtained through taxation by the government. Financial appropriations are a vital part of any operation and equally so for educational institutions.

Considerations about the faculty qualifications are important. The faculty should be oriented to the goals that are to be attained and methods to be employed in reaching the goals. The primary interest of the students must be assumed to be to become knowledgeable, capable and qualified technologists. After graduation they should be able to provide a service to the public by producing and administering ionizing radiation for diagnostic and therapeutic purposes. The entire faculty, be they at the College/University or at the hospital should be aware of and striving for the same goals. Students enrolled in a particular speciality area should be taught those courses beneficial to obtaining the objective. Emphasis should be placed in those areas that apply to the profession and in which the graduate is expected to apply their expertise. All instructions presented, whether at the college or hospital should be so coordinated that the students receive maximum benefits.

Lecture material presented at the college should be reinforced or reemphasized by the clinical instructor during the time students are under their jurisdiction. Both the college and hospital portions should be one program and should complement each other and not compete. All members of the faculty, both college and hospital should be qualified. The term "qualified" is a rather nebulous term, since what or who determines the qualifications of an instructor? Does the curriculum vitae which indicates the individual has earned three Ph.D's and two Masters Degrees assure one that this is a potentially good qualified instructor. Not necessarily so. It is an indication that this person has been exposed to education in sufficient quantities and should be able to function effectively as an instructor. I believe the ability to communicate with students as individuals and as a group, to disseminate meaningful information, to encourage students to extend themselves beyond their limits to reach their objectives. To do this does not require a string of titles or degrees but interest in the student, the profession and most of all the public which we will be dealing with.

As I indicated earlier I think students enrolled at colleges and universities in programs of Radiologic Technology should be integrated wherever possible into courses with students from other areas. Students enrolled in allied health programs should be accepted completely as students and not someone that we apply a condescending inflection to that we allow you the privilege of attending the college for two or three courses at the completion of which you will return to the hospital and be forgotten. As a student, they pay tuition and necessary fees as do other students and should receive the same consideration. Because of the nature of the materials student technologists will be required to know it is not a simple matter to incorporate them into a large number of courses but they may easily be included in languages, psychology and other courses designed to provide a broad base of education rather than merely a confining curriculum designed to provide only enough information to satisfy the most minimum standards. I often hear the term or phrase used that student technologists are being "over-educated". No one has ever been able to define how this is accomplished. Since the entire life expectancy of an individual is one of learning, how then is it possible to over educate. It has been stated that to incorporate technology students into curricula with students from other disciplines assists in the over-educating process. I do not agree with this philosophy. It is my belief that the basic information pertaining to the particular area of interest should be presented, and additional information as well. As educators we must exert every effort to provide information useful in reaching the ultimate objective which is providing well informed competent graduates who will assume the position of technologist and function efficiently and effectively in this capacity. I have what is perhaps a personal idiosyncrasy relating to the oft used phrase, "training technologists." I personally deplore the phrase and think that we are educating individuals who after a specific amount of knowledge has been recieved and a level of competency attained will function as technologists or anything else they care to attempt. Now that I have said this I hope you allow me this privilege. Re-evaluation of existing programs: I think this is the only segment of this conference addressing itself to this item. I think the criteria presently in effect for evaluating programs is essentially good, and only need to be enforced. Programs presently in existence should be re-evaluated within a specified amount of time and where deficiencies are noted, should be made known and a period of time in which to correct them given. At completion of the alloted time, a re-evaluation should take place and action taken. There are many problems existing which precludes an effective survey, the greatest being adequate number of qualified personnel to perform the inspections.

Recognizing that such a situation exists, I still feel that we have the vehicle by which standards may be evaluated and guidelines established. If it is the belief that present standards are inadequate, then let's establish new standards and guidelines to provide a better, more efficient way to reach the objectives. Whatever standards are agreed upon should be enforced and everyone involved should be required to abide by them. When evaluating programs, if either old or new and deficiencies are found, they must be made known to responsible personnel. I sincerely believe that everyone involved is concerned, and justly so, with the education of technologists. I hesitate to say this, but I will: There are persons presently involved with student technologists who are exploiting them to the nth degree. It is not a nice thing to say, but, at the risk of being railroaded out of here, I know this situation exists. Any program found to be exploiting students, for whatever reasons, should have its accreditation taken away.

Reactor: Richard Wilson, Ph.D, Acting Associate Director
American Association of Junior Colleges

First I want to support John Caffrey's first idea, that is, let's get rid of this tradition against candor, let's be honest, let's say as clearly as we can what we mean. I suspect that it's accurate to say there is a real thing against management, especially in universities. I don't think it's quite true in community colleges. For example, John says that you must not say that you want to be a president because it's a sure way not to become a president. Again, I don't think that's true in the community colleges. One example of this is the Kellogg program to train, and I use that word "train", administrators for community colleges. That program started in 1961. I really don't know how many people graduated from it with doctorates but to the best of my knowledge almost all of them have gone into administration. They are managers. So I don't believe we have quite the same resistance in the community college field to the idea of management or administration that there is in the universities. (While I'm talking candidly about language - and I must confess that management doesn't bother me one bit - I feel the same way about training. Mr. Stevens said that he prefers the word education to training. I think training is a perfectly appropriate word. I'm reminded of what Gabe Ofiesh, who happens to teach at a university not far from here, says about training and education. He says that education is the name given to poor training. He's right more often than wrong.)

Another thing I would like to react to that John talked about: Toward the end, he said the most important tool for managers would be the technique of simulation. I think we understand what he said. I think we understand that the computer is that marvelous machine that can enable us to simultaneously manipulate dozens of variables and to simulate what will happen over the next five or ten years or whatever period of time we're interested in. That's fine. We have one big problem with simulation. We don't know many of the causal relationships. By that I mean we can handle the variables but we don't really know what causes what to happen. We don't really know how to adequately or reasonably run a simulation. There are some exceptions, but unfortunately there are many variables we don't really understand, independent variables that may or may not contribute to certain results. Let me give you an example. We're concerned about enrollments.

In the national association I represent, we're concerned about gross national figures. We are presently enrolling 2.4 million students in two-year colleges and we are asked how many students will be enrolled in two-year colleges in 1980, ten years from now. We generally fall back on uncomplicated extrapolations, linear projections into the future. If we use a simple extrapolation, holding everything constant in terms of the number or percentages of students that go to college right out of high school and how they'll be distributed among the various kinds of higher education institutions, we arrive at a figure of 3.7 million for 1980.

On the other hand we can begin to manipulate variables, such as increasing the number of high school graduates that go directly to college and greatly increasing the number of adults who continue their education. The last possibility is especially critical, the idea people don't reach closure with a bachelor's or associate degree or even a Ph.D., the idea that education is a continuing activity. If that idea really sells - would you believe there's a federal government report that says the outside figure is 12 million students by 1980. That is quite a range. A range of 8 million students. It all depends on what our assumptions are, and as administrators we always have those back there someplace. What are our assumptions about community college and what they are going to be doing 10 years from now. What are the casual connections? This, I think, is the biggest problem of simulation. We just don't know enough about what we're doing.

Let me move on to react to some things that we heard yesterday and to again try to make some fairly candid statements. One thing that we ought to keep in mind as administrators, and this gets over into another group, is the importance of external forces that we contend with when we try to push different methods, such as work-study or cooperative education methods which I certainly favor. (By the way, it struck me as very interesting yesterday when the first speaker, Dr. Rousselot, was talking - the second thing he talked about was the military experience directed into medical careers placement program. The idea was that they were trying to find people in the service who were interested in applying their military experience toward a medical career and continuing their education. You'll recall that 75% of those people preferred a work-study program -- seventy-five percent. That's a significant percentage. Twenty-four percent were interested in employment and only 1 per cent interested in full-time education. I think we ought to keep that in mind.) What I'm saying is that a lot of students - a lot of people who are interested in these kinds of careers want a mixture of education and the practical - the applied. What I'm leading to is, if we try to develop our programs using more cooperative education and work-study experiences, in a way we can reduce our capital costs. In other words, if we can use facilities that are already available in the community, we don't have to have quite so many facilities at the college. So we can reduce capital costs. On the other hand, I think all of us know that to operate a program like this, we have higher operating costs. We have to have more people, people who are especially qualified to do certain things. So our operating costs go up. We save money on the one hand, we lose money on the other hand.

Unfortunately, most state accounting offices have an interesting outlook on life. You can take money out of operations and spend it on buildings, but you can't take money out of the capital or building side and spend it on operations. So I think as administrators we need to begin to work in the direction of bringing these monies together, giving the people the flexibility of spending the money however is best for that particular college and getting away from some rather antiquated budgetary or accounting restraints.

A second point that came up yesterday is that people, certainly the politicians and state officials, are demanding efficiency in the use of facilities and staff. I was really surprised to hear Mr. Stevens say that they always had more students than space, because based on my visits to colleges and what evidence I've seen, this is not a national problem. We have a lot of unused space. Perhaps some people have a limited view of when space is available. Perhaps some people in the field think that space can only be available from 11:00 a.m. until 1:00 in the afternoon. I'm inclined to say space is available at least 5 days a week, at least 12 to 14 hours a day, and should be available on Saturday too. So how do we handle these kinds of disagreements regarding assumptions about the availability of space? What I'm leading to is, we're going to have to do a better job of utilizing the space that we already have because the demand for accountability in part stems from the demands we're making on external sources for money. Just in the community colleges, just in two-year colleges last year, we spent an estimated 2.7 billion dollars for operation of institutions. 2.7 billion last year, and it's fair to say it's going to be a lot more this year. In addition we're making demands for new facilities. Some estimates go as high as a billion dollars a year for the next 10 years. So if we're going to be demanding this kind of financial resource from the public sector, I think it's reasonable to expect that they're going to continue to demand more accountability from us. We'd better be prepared to explain why we need more facilities and more staff.

A third thing that we were talking about yesterday was how we need projections of job demands. I wish we could simulate this so we could make accurate job demand projections. Again, I don't think we understand enough of the causal factors that are operating here. That is the thing we're going to have to solve. Another thing that keeps coming to my mind, and we talked about the specific occupation programs, is the need for flexibility in changing occupations. It used to be we talked about career ladders. Now we talk about career lattices. As I understand the concept, it means that not only can we move vertically, but horizontally, or at an angle. The idea is that people do enjoy changing occupations for various reasons and they ought to have this capability without always going back and starting over again.

Now let me just really stick my neck out. It seems to me, having worked on curriculum development in several subject and occupational areas, one of the biggest myths we have - and we hear it all the time - is that there is a definite common output that we want in a given occupational area. In other words, down here at the end, there is someone, technologist or technician, someone and that person has to have definite skills and knowledge. And we can all agree on what they are. I have yet to see any particular occupational area or any particular group of disciplinarians agree on what these things are. We talk about it as if - yes, we understand that out here at the end, these people will have these skills, these knowledges, these attitudes. We all agree until we try to sit down and try to identify specific outputs. We have enough difficulty agreeing on guidelines. But to be able to agree on what these people need to be able to do, I've yet to see it done. I think it's a myth. Now, this is not to say it can't be done; but it doesn't answer the question, should it be done? It may well be that what these people need in Massachusetts to perform well on the job is not the same thing they need in St. Louis. If that's the case, why not be honest with ourselves and settle for whatever parts of a program we can agree on and go on from there.

Let me also suggest this - that as administrators, our first obligation is to the student. That's our first obligation. I know we get into some real arguments on this because some will argue that our first obligation is to the employer or to the society at large. I'm going to argue that our first obligation is to the student. Specifically, we are obliged to make sure the curriculum objectives are relevant, that we aren't making unreasonable demands, asking for things that may have been great 10 years ago, but are no longer being used. I'm reminded again of computers. Where I previously worked, we discovered we were failing a lot of students in a unit record equipment course. It was one of the required courses for everybody going into computer sciences. For most students there was really no reason for even taking the course, aside from its historical value. And yet this was one of the first courses they took. They didn't need unit record equipment because they really weren't going to use that in the jobs for which they were being prepared. Nevertheless, until we finally caught on to what we were doing wrong, we kept failing the students and discouraging them from data processing. We need to establish reasonable prerequisites and not just write it down and make no attempt to see if students really do need those kinds of skills.

Another thing that should be kept in mind, at least based on what students have told me through the years, is that they want an immediate introduction to their speciality. They don't want to be told - well, you take these courses, these are wonderful liberal arts courses, you take these for a year and then you can take specialized courses. They don't want this. They want immediately to begin to get some practical experiences and see what that job is all about. The students want assurance that at the end of the program they will be competent. In other words, they want us to check and double check and triple check with the employers, make sure that the job analyses are done and that task analyses are done, that these people will really be competent when they graduate. They don't want to walk in, be told by the employer - Well, that college is all right but really you are going to have to learn more things here than you ever learned at college. This isn't what they want. They want to be able to walk in and immediately begin to produce and feel as if they are a valuable, productive employee. It seems to me that students, at least most of the students interested in these kinds of programs, prefer work-study and cooperative education. They want a mix of the practical and theoretical, and if this mixture is done in a reasonable or in a logical way, it isn't one of those things where what you learn in a practical situation is never discussed later in a theoretical situation or a classroom situation. They want a meaningful mix.

Finally, I was glad to hear one of the speakers mention late yesterday afternoon that we ought to be sufficiently flexible and smart to admit students with advanced standing. If they have learned some things, why can't we give them credit and let them move on instead of saying - well, you're going to have to start back here because everybody starts here. To conclude these rather lengthy reactions, let me make this point. Administrators and again I'm referring to deans, vice-presidents - must begin to ask the right questions and demand answers to these questons. By right questions, I have in mind such things as this: What happens to students? How many dropped out during the first two or three weeks? How many dropped out at the end of the semester?

We need follow-up studies to find out why they dropped out, to find out what happened to those who did complete the program. How are they doing on the job? What's their reactons to the education and experience that they have? And don't stop there. Let's also talk with the employers and find out what their reactons are to the people we are graduating. And so, as an administrator, I would be very anxious to have a very small division - you can call it institutional research. If you have an industrial mind, you can call it quality control. But someone at that college - I don't mean one in the singular person - but some part of that college has got to continually evaluate, follow-up and find out how well we are doing in each program that we're offering.

*Special Handout Material

SURVEY RESULTS OF COLLEGE AND UNIVERSITY-HOSPITAL AFFILIATED PROGRAMS IN RADIOLOGIC TECHNOLOGY IN THE UNITED STATES

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Lecturer in Radiologic Technology
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One of the primary responsibilities of persons involved in schools of radiologic technology is the continued evaluation and upgrading of their programs to meet the tremendous advancements in the field of radiologic technology. These technological advancements require not only more highly skilled technologists to perform the radiographic procedures but also educated supervisors, administrators and teachers.

The supervisors and administrators must be competent not only in technical procedures but also in sound management principles and practices.

If we are going to produce more highly skilled technologists and supervisors, it certainly becomes apparent that we must first strive to upgrade the educational background of those who teach in the field of radiologic technology. This caliber of educated teachers can come only from colleges and universities with an education department to provide proper courses in education methods, philosophy of education, educational psychology, etc. As the number of baccalaureate degree graduates increases and demonstrate their superior knowledge and skill, the college and university degree programs will receive the full recognition that they deserve.

To take a giant step forward in upgrading the education of technologists, this writer feels that there should be closer cooperation and more communication between the personnel of these degree programs in radiologic technology.

This feeling of a common purpose was the basis for the survey questionnaire sent to all of the colleges and universities listed as hospital-affiliated in the 1968-69 issue of Approved Schools of Radiologic Technology.

This survey was designed to serve three purposes: to determine the extent of college and university involvement in the hospital affiliations, to determine the number and type of degree programs and

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* Submitted by Special Resource Speaker: Dwight Marshall, Dean
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to exchange program literature with those participating in this survey.

The questionnaire and an introductory letter was sent to 176 colleges and universities throughout the country. The questionnaire consisted of eleven questions and a request for a list of hospitals with which each college was affiliated.

From 176 questionnaires sent, there were 95 responses which represented a 54% return. There was no response from 81 of the schools. The 54% return (over nearly a year) is considered very good by this writer, and should provide some meaningful information, particularly on the degree programs.

The following are the questions on the survey questionnaire and the responses to each question. The number of responses to each question will indicate that each participant did not answer all questions on the questionnaire. The percentages given represent the percentages of returned questionnaires, not of the total number of questionnaires sent out to the schools.

Question #1. Does your university or college have a staffed department of radiologic technology?

Total Response	92 (97%)
Yes	40 (42%)
No	52 (55%)

Question #2. If your school does have a department of radiologic technology, what college or division is it a part of?

Total Response 30

This writer did not anticipate the great variety of responses that would result from this question. There were almost as many different responses as there were total responses. A few of these are listed as follows:

Health Occupation Division	4
Division of Science	2
Division of Professional Studies	1
School of Allied Health Professions	1
Life Science Division	1
Vocational-Technical Division	1
College of Education	1
Health Technology Department	1
Science Technology	1
College of Medicine, Division of Health Sciences	1

Question #3. Who is the chairman or head of this department? (Please give the name and exact title: M.D., Ph.D., M.S., B.A., R.T.)

In this question, the writer was primarily interested in the title and educational background of the persons listed as chairman of these departments of radiologic technology. The name was requested as a means of sending the results of this questionnaire to the right person.

Total response	37 (40%)
M.D.	13 (14%)
Ph.D.	3 (3%)
M.S.	9 (9%)
B.A.	6 (6%)
R.T.	6 (6%)

Question #4. Does your curriculum lead to a Bachelor of Science_____, Arts_____, Applied Science_____, or others__________, Total credit hours______.

Total response	13 (14%)
Bachelor of Science	12 (13%)
Bachelor of Arts	0
Bachelor of Applied Science	0
Others:	
Bachelor of Technology	1 (1%)

Of the 95 questionnaires returned, there were 13 responses to this question, indicating 13 baccalaureate degree programs in radiologic technology.

With a 54% return of this questionnaire, statistically this could indicate the possibility of 25 baccalaureate degree programs throughout the United States. However, in reality this is probably not true. Of the 81 questionnaires not returned, it is more than likely that a much larger percent of these programs are not degree programs in radiologic technology.

Question #5. Does your curriculum lead to an Associate of Science_____, Arts, _____, Applied Science________, or others ______ ____________; Total credit hours_____. 60-89 semester credit hours, 90-123 quarter credit hours.

Total response	38 (40%)
Associate of Science	13 (14%)
Associate of Arts	11 (12%)
Associate of Applied Science	10 (11%)
Others:	

Associate Degree	1 (1%)
Associate in Technology	2 (2%)
Associate Health Science	1 (1%)

Of the 95 returns, there are 38 associate degree programs in radiologic technology. Again, statistically this could indicate the possibility of near 80 associate degree programs in radiologic technology. This of course does not seem to be true. It seems logical that those schools without any program would be less likely to respond to the questionnaire.

Question #6. Does your curriculum consist of a limited number of hours which supplement your affiliated hospitals' basic program in radiologic technology?_____. If yes, how many semester (or quarter) credit hours do the students receive at your institution?_____.

Total response	44 (46%)
Yes	5 (5%)
No	39 (41%)

Of the five schools that indicated support courses for hospital schools of radiologic technology, the credit hours ranged from 5 to 46 hours.

Question #7. Do you contemplate developing your program to lead to an associate degree?_____, or to a bachelor degree?_____.

To an associate degree:

Total response	52 (55%)
Yes	3 (3%)
No	49 (52%)

To a bachelor degree:

Total response	52 (55%)
Yes	10 (11%)
No	42 (44%)

The response to question #7 completely surprised this writer. Certainly the development of bachelor degree programs will do a great deal to promote the educational offerings in our field of radiologic technology.

Question #8. Do you have any registered radiologic technologists employed as full-time faculty members?_____. How many?_____.

Total Response	40 (42%)
Yes	32 (34%)

No	8 (8%)

How many responses:

1 member	13 (14%)
2 members	13 (14%)
3 members	4 (4%)
4 members	1 (1%)
5 members	1 (1%)

Of the eight (8) no responses most indicated part-time faculty members.

Question #9. Does the university curriculum and hospital practicum run concurrently or are students required to have one year of university studies before starting their practicum?

Total response	55 (58%)
Concurrently	35 (37%)
Non-concurrently	20 (21%)

Those programs in which the curriculum and practicum were not run concurrently are quite varied. There were five schools that indicated the students must have one year of school first, and five schools that required two years of school first. By far the most common practice is to run them concurrently.

Question #10. Are there any allowable credits for registered radiologic technologists going into your associate degree program?

Total response	38 (40%)
Yes	20 (21%)
No	18 (19%)

Many that indicated they would allow credits for registered technologists, was on the basis of passing challenge tests.

Question #11. Would you please identify (by a, b or c) in your catalog, those courses taught by:

a. Registered radiologic technologists employed as full-time university or college faculty.
b. Full-time university faculty outside the Department of Radiologic Technology.
c. Part-time faculty, adjunct professors, or other affiliated hospital personnel.

As one might imagine the result of this question is quite involved and varied and an accurate analysis has not yet been completed.

Question #12. This was not really a question but rather a request for a list of hospitals with which each college or university program is affiliated. These lists were similar to those in the 1968-69 edition of Approved Schools of Radiologic Technology but with some additional hospitals added.

In summary, there is little doubt that college and university programs in radiologic technology are on the increase and with great interest in the baccalaureate degree program. This will certainly do much to upgrade the education of teachers and supervisors in our field. This in turn will improve the caliber of working technologists and give improved patient care throughout our country.

WORKING DRAFT, DECEMBER 1970
RECOMMENDED SPACE & EQUIPMENT NEEDS FOR A COLLEGE-BASED A.S. (or A.A.) PROGRAM IN RADIOLOGIC TECHNOLOGY*

Charles A. Jacobi, R.T., M.T. Associate Professor Chairman, Department of Radiologic Technology	Duane T. Pierce, R.T. Lecturer, Radiologic Technology

Special Radiographic Procedures Room

This room would be used for teaching all radiographic procedures except mobile procedures.

1. Room size - 25x30x12 + (6x8 for control booth)
2. Student station - 3
3. Electrical requirements 360-440v, 3-phase, A.C., 60-cycle
4. Lead wall protection - (1/8") 7'x80'x32¢lb = $1,433.60
5. Equipment cost $155,000 to $194,611
   a. 1000 MA, 120kVp, 50KW generator, 3 phase
   b. 12:1, 100-line grid
   c. overhead track for tubes
   d. bi-plane
   e. image intensifier, TV & Cine attachment
   f. Wall cassette holder

Mobile Radiography Room

This room would be used for simulating bedside and surgical

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*Submitted by Dwight Marshall, Dean,
College of Allied Health Professions
University of Nevada, Las Vegas

radiography.

1. Room size - 20x30x12
2. Student stations - 3
3. Electrical requirements - 110 or 220V, single-phase, AC, 60 cycle
4. Lead wall protection (1/16") 7x50x32¢lb = $455
5. Equipment cost - $8,200-$10,200
    a. 200 MA, 150 kVp mobile x-ray unit
    b. surgical-fracture table
    c. electrically operated hospital bed

Processing Room

This room would be used for teaching both automatic and manual processing techniques.

1. Room size - 10x14x12
2. Student stations - 3
3. Electrical requirements - 110-120V, 60 cycle AC
4. Equipment cost
    a. Automatic processor $8,900.00
    b. Cine processor $6,100.00
    c. Manual tanks and accessories $3,798.50

ADMINISTRATION WORKSHOP REPORT

The Administration workshop group was asked to address itself to the functions of administration in the development of a college-based radiologic technology program. Educational administration or management was defined in this workshop as the process of making a program work. It is influenced by:

How the administrator spends his time

How the administrator relates to people

How the administrator obtains and uses information

How the administrator uses money

How the administrator works with ideas

Educational management is unique in any given program. Discussion of this workshop on administration indicated that the functions of a college-based R.T. program include: student and faculty recruitment, student admissions, faculty preparation, physical facilities (equipment costs), funding (program costs and available external sources), curriculum implementation, communication between clinical and college personnel (contractual agreement, student assignment to clinic, etc.), utilization of credit-by-examination options, and an analysis of basic program goals.

ADMINISTRATION PHILOSOPHY

Educational administration refers to the process whereby students are prepared for careers as radiologic technologists. College administrators are charged with the human, economic and social resources of the students, faculty and the community.

The beginning assumption for consideration by the administration concerns the right of the health care consumer to adequate protection in health care delivery. This can only be achieved by a responsive educational system, a certification system and enforcement of protective laws and regulations.

Radiologic technology, as an emerging profession in the allied health professions, finds itself at an early state of the art. Much effort remains to define job requirements of the professions, the measurement tools for assessing capabilities and the optimal curriculum model for achieving performance objectives.

In the past a major portion of the training of radiologic technologists has been carried out in hospitals using an apprentice type mode for transmitting the necessary knowledge, skills and attitudes. The trend during recent years has been the incorporation of programs into academic settings which could strengthen the resources available for the students by increasing his exposure to a greater variety of educational resources.

Any program of radiologic technology rests upon an integration of didactics and clinical educational experiences. The implementation of this program is best met in a joint educational merger of a college and clinical setting. Primary administrative and organizational responsibility rests with the college or university. The college retains responsibility of student clinical experience and will furnish a full time college instructor for this purpose.This responsibility is not in effect when it pertains directly to patient care.

The design of any program begins with the maximization of opportunities for the student which may lead to lateral and vertical career mobility and should offer the student transferable credits for an extension of his education.

A legal clinical education contract should be developed and agreed upon by both the college and the clinical facility. (An example appears attached at the end of this workshop report). The organization of the program should concentrate much of the educational effort in the college based setting. An advisory committee should be established which includes representatives from the college administration and instructing hospital administration, the radiology department (both radiologists and radiologic technologist), students, consumers and other community resources. College based facilities should include energized laboratories which approximate the clinical setting to the extent possible so that there may be a direct transfer of learning.

Since educational goals are the primary emphasis of this program, financial support and work study programs for students should be organized on a similar basis with existent college career programs. The college or university should attempt to assist students through a regular program of scholarships and/or work study opportunities. Hospital work, other than required clinical unit experiences, should be encouraged for students on a regular employment basis in departments other than the Radiology Department. Stipends, in lieu of employment should be discouraged.

An educational program in radiologic technology should be as comprehensive as possible and include opportunities for in-service education for radiologic technology practitioners. Examples of groups whose needs might be considered are:

I. The college will provide in-service education programs which are available to:

  A. current radiologic technologist personnel without college course experience
  B. non-radiologic technologist personnel employed on a full-time basis and seeking R.T. status
  C. R.T. instructional faculty (updating of educational methods and technological information)
  D. R.T. personnel and graduates of the college-based program in need of periodical short course or refresher program.

II. Credit by examination should be developed. These exams will be available to:

  A. armed services trained personnel in search of civilian employment
  B. students in a current program being phased into a college based program
  C. non-R.T. practitioners seeking college credit
  D. current R.T. non-college trained
  E. equivalency examinations should be developed for college credit.

III. The program should also encourage information dissemination to the general public which will:

  A. inform the public as to the role of the R.T. in the delivery of health care
  B. discuss the practicality of the career program - again in reference to the health care delivery system
  C. serve as a recruitment mechanism.

An assumption made in this workshop was that in the presence of an actively integrated academic and clinical program having an energized radiologic laboratory, the radiologic technologist may be adequately educated in a period of two years.

Such a two-year program must include a curriculum based on performance criteria arrived at in a proposed curriculum conference. The primary goal of the conference would be the production of a two-year degree curriculum with such performance criteria replacing the current clinical hour criteria. Conference participants should include representation from A.C.R., A.S.R.T., A.A.J.C., A.S.A.H.P., DHEW and personnel from various selected community junior colleges, other two-year post secondary institutions, four year colleges and universities. This assumption identifies the urgent need for the immediate collection of existing data and the development of a research program which would develop performance criteria, design a curriculum model, evaluate this model and generally test this assumption.

FACULTY AND EXTRA MURAL RELATIONSHIPS

I. Faculty

The following recommendations apply to technologist faculty members. They are designated "technologist faculty members" to emphasize their employment by the college. Other titles may be recognized and proper.

A. The technologist faculty member must be a registered technologist.

(Explanation: specification of the certification of the American Registry of Radiologic Technologists is consistent with recognition by organized medicine of the only current, national standards for radiologic technology) Licensure, where applicable, may take precedence or complement the recommendations.

B. The technologist faculty member should be experienced as a practicing radiologic technologist.

C. The experience of the technologist faculty member should be directly related to his teaching duties. Typically, this experience should be in:

1. routine radiographic procedures
2. special procedures in all anatomical systems
3. use of radiation protection techniques in accordance with prescribed procedures
4. x-ray machine circuitry
5. automatic and manual processing systems.

D. The technologist faculty member should progressively pursue educational experiences such as:

1. preparation for academic degree
2. continuing professional education and
3. improvement as a teacher

(Explanation: It is highly desirable to have teaching experience prior to entering the college as a faculty member. Technologists experienced in teaching are not readily available throughout the country. These recommendations recognize that educational administrators will need flexibility in recruiting and appointing faculty. These recommendatons also point out measures which are reasonable to expect to maintain a high level of competency in communication and technical knowledge and conform to local requirements.)

II. Extra-Mural Relationships

Until measurable performance criteria and standards are established and accepted, college administrators must realize that the authority for certifying students as eligible for registration by the American Registry of Radiologic Technologists rests with the radiologists. Equal responsibility for this certification rests with the technologist - director of the program.

(Explanation: The foregoing statements recognize that there is not now an accepted performance standard to determine the point at which program objectives are achieved. These statements also alert the college administrator to accepted working relationships in the practice of radiologic technology which must be reflected in the educational program and the agreements or contracts.)

A. The burden of coordination and the ultimate responsibility for achieving the goals and objectives of the program centers at the college.

B. Radiographic procedures carried out during practicum and the procedures of patient care during practicum are the responsibility of the department of radiology of the health care agency.

C. Written agreements or contracts specifying liabilities, working relationships, liability for industrial accidents, workman's compensation and an educational plan are necessary.

(Explanation: The foregoing three recommendations imply that there are responsibilities which cannot be transferred from the health care facility to the educational institution, and that there must be a strong desire on the part of both parties to the educational venture to reach success in the best interests of the student and health care. The foregoing recommendations also imply that it is the clear responsibility of the college to take actions to assure continued achievement of the goals of the program, even to the point of exercising its right not to renew or cancel an affiliation contract. This right and responsibility, in the interest of the goals of health care also, belongs to the health care facility.)

D. Faculty and energized radiographic laboratory equipment should be based on the campus.

(Explanation: This recommendation is a reaffirmation of proven and accepted teaching principles used in other disciplines for years.)

E. Adjunct faculty appointments for selected hospital personnel are desirable to encourage:

1. status
2. communication
3. availability to render teaching service
4. identification with the college
5. participation in in-service education

(Explanation: The foregoing recommendation does not exclude the fact that financial compensation might accomplish goals 1 through 5. It is entirely possible that appointment to adjunct status will accomplish these goals. More important is the fact that the foregoing recommendations are basic to establish the communication essential to the success of the program. The benefits of in-service education will be of assistance to hospital based technologists in improving their teaching skills. The reverse is also true. In-service education provided by the hospital and available to the technologist faculty member will also assist him in maintaining a high level of professional and technical capability.)

PHYSICAL FACILITIES

Community colleges considering the inauguration of a curriculum in radiologic technology should be prepared to provide adequate space and equipment for the operation of a successful program. The amount of space and equipment will vary, of course, with the size of the program that is being planned.

I. Space Requirements:

In addition to the standard office space and physical facilities provided all faculty, the following specially designed space is recommended:

A. A radiologic laboratory properly wired and shielded for energized x-ray equipment. Special attention needs to be given to the dimensions of this room since the overhead x-ray equipment requires a ceiling that may be higher than normal. More detailed information may be obtained through the various x-ray equipment manufacturers.

B. A classroom equipped with modern audio-visual equipment. A demonstration x-ray table and overhead track and tube is desirable in this room but not necessary. (In some institutions the lecture room opens via a sliding partition into the laboratory making a table and x-ray unit immediately available for lecture-demonstrations.)

II. Equipment:

A. An energized x-ray tube mounted on an overhead track with an adequate collimating device, controls and generating equipment together with a 90° tilting x-ray table. The x-ray equipment and operation must meet state and national standards. This equipment should be modern and comparable to that which the student will be required to use in the hospital. The cost of the above unit may be $30,000 to $35,000.* (Large programs may require several of the above units. By efficient scheduling of time, 25 to 30 students may be taught through the week with just one unit.)

* Current market cost estimates

B. Illuminators - At least two sets of eight. (About $400 each).

C. Phantoms

1. At least one articulated phantom for laboratory positioning and x-ray experience ($4000).
2. At least one disarticulated phantom is desirable. ($5000).

D. Skeletons

1. At least one articulated skeleton ($300).
2. At least one disarticulated skeleton ($250).

(These skeletons to be used in the x-ray lab and will be in addition to those in anatomy laboratories.)

E. Automatic, high-speed film processor. ($6,000-10,000)

F. Processing tanks ($750)

G. One complete set of cassetts ($500)

H. Radiation detecting instruments ($1500)

I. The college will be responsible for providing each student with adequate personnel monitoring.

J. Miscellaneous lead aprons, gloves, lead blockers, calipers, etc. ($1000)

K. Adequate library material must be readily available.

The above equipment will adequately provide for a beginning program of small to average size. (15-30 students). The cost will be approximately $60,000. For each additional energized x-ray unit, add $30,000.

There are many optional pieces of equipment such as, mobile x-ray units, fluoroscopes, nuclear medicine and radiation therapy equipment which can be added but are not essential to the operation of a good diagnostic x-ray program.

It is suggested that those programs presently established without such energized laboratories should be encouraged to provide some to conduct an adequate educational program.

FUNDING

I. In response to the minimum standards of requirements for funding of allied health educational programs, the responsibility should be vested in the sponsoring college. These funds may be obtained from numerous sources, e.g., Federal, State, local, educational funds, foundations, private philanthropic groups, related industry, professions and hospitals. More specifically, program and educational funding may be derived from Public Law 90-976 which is the Vocational Educational Act as amended. Part A: Grants to students with exceptional financial needs are made through the educational institution. Part B: College work-study programs. Allied Health funding is available if the institutions qualify. (Bureau of Allied Health Manpower, NIH, PHS, DHEW) State and local community scholarship funds will be dependent upon the availability of funds.

II. Funding for programs in radiologic technology should be considered equally with other educational and/or vocational programs in the college. Recognizing that different amounts are required for implementation of allied health programs, each is to be considered as part of the total administrative costs.

III. Allocation of funds should be made by the institution with adequate attention and dispersion of funds to: faculty, equipment and physical facilities, promotional and communication, administration, travel and meetings, students.

Sample Clinical Education Contract

MONROE COMMUNITY COLLEGE
410 Alexander Street
Rochester, New York

CONTRACT

Agreement between __________Hospital and __________Community College.

Agreement made and dated this _____ day of __________, 19 __, between the Community College, hereinafter referred to as the "College" and __________ Hospital, hereinafter referred to as the "Hospital":

It being the intent of the College and the Hospital to cooperate in the education of x-ray technology students, it is therefore agreed:

1. That the College will assume full responsibility for the planning and implementation of the educational program in x-ray technology including administration, programming, curriculum content, faculty appointment and requirements for matriculation, promotion and graduation;
2. That the College will provide faculty for instruction and supervision of students assigned to hospitals for clinical laboratory experience;
3. That the College will plan a schedule of student assignments and will make individual student assignments. The plan schedule shall include dates, number of students, number of instructors, time and clinical area to be utilized. The schedule shall be submitted by the College to the Hospital for its approval and shall be subject to such approval;
4. The Hospital will retain full and final responsibility for the supervision of patient care and the College will be responsible for assuring that both students and instructors will comply with the roles and regulations of the Hospital insofar as they pertain to activities of both while in the Hospital.
5. The College assumes responsibility for damage to equipment and supplies caused by its instructors or students above and beyond the normal wear and tear to which such equipment and supplies are subjected through normal use:

And be it further agreed:

6. That the Hospital will make available its designated

clinical areas for student experience;

7. That the Hospital will provide adequate space for pre and post conferences and instructional material and equipment from the College;

8. That the Hospital will provide necessary locker room facilities for students and instructors from the College;

9. That the Hospital will provide orientation for the College faculty;

10. That the Hospital will permit students and faculty, at their own expense, use of the Hospital cafeteria as necessary;

11. That the Hospital will make available emergency medical care to students and instructors who may become ill and who may be injured while at the Hospital.

And be it further agreed:

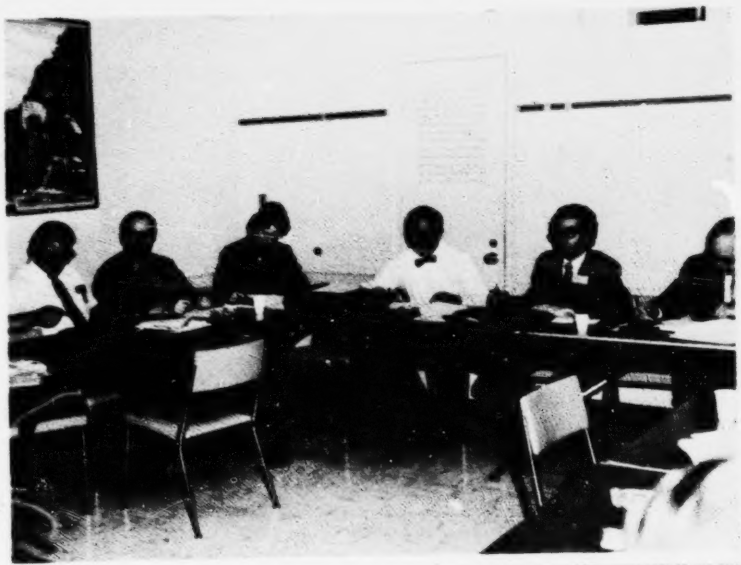
12. That students will provide their own medical care except as stated in 11.

This agreement shall become effective immediately and will continue in effect until terminated as hereinafter provided. The agreement may be modified upon request of either party and with the agreement of the other at any time, or it may be terminated by either party upon one year's written notice to the other.

For____________________________
Signed__________________________
Title___________________________
For____________________________
Signed__________________________
Title___________________________

MANPOWER WORKSHOP

Manpower needs related to a statistical overview of the radiologic technology population and need for training programs; present recruitment programs; examination of entrance requirements; and student support.



MANPOWER WORKSHOP

Workshop Moderator	Edwards, Clayton L., Director Image Associates, Inc.
Overview Speaker	Canter, Ralph, Ph.D., Director for Manpower Research Office of Assistant Secretary of Defense
Reactors	Light, Israel, Ed.D., Dean School of Related Health Sciences University of Health Sciences
	Ott, Theodore T., R.T. UCLA Medical School
	Rosenbaum, Harold, M.D. University of Kentucky Medical Center
Special Resource Speakers	None

Recorders (Bureau of Radiological Health Personnel)

Bostrom, Robert, Instructor
Rockville Training Section

Broseus, Roger, Instructor
Rockville Training Section

Other Workshop Participants:

Mr. John David Adair, Jr.
Mr. John Bacon
Mr. Kenneth Bontrager
Mr. John B. Cahoon
Mr. Alan Cohen
Mr. Earle Cook
Mr. Arve Dahl
Mr. Saul J. Harris
Mr. John Hershberger
Mr. Paul Ichino
Miss Marian McDaniel
Mr. William K. Melton
Dr. Raymond T. Moore
Dr. Albert E. O'Donnell
Mr. J. Allen Tanner
Miss Shirley D. Vickers
Mr. Leslie Wilson
Dr. John H. Woodruff, Jr.

MANPOWER CONSIDERATIONS IN COLLEGE AFFILIATED TRAINING OF ALLIED HEALTH PERSONNEL

Overview Speaker: Ralph Canter, Ph.D.
Director for Manpower Research
Office of Assistant Secretary of Defense

I. The 1969 Manpower Report to the President contained this section on paramedical personnel:

> "The serious shortage of manpower in health occupations has been of concern in manpower planning and policy for some time. There is need now, the Secretary of Labor pointed out in the 1968 Manpower Report, for half a million more workers in this field. For the next 10 years, he said, 10,000 new workers will be needed each month, not counting replacements. He listed three possible approaches to a solution of this manpower shortage: 1) Use present manpower more effectively - redesign jobs or create new ones, so that professional workers can use their highest skills, while supporting personnel take over the less demanding tasks; 2) make pay, working conditions, and career opportunities more attractive; and 3) bring about close cooperation between private health agencies; training institutions, and the government, to increase training capacity and raise the level of productivity in all health service occupations.
>
> A number of studies reinforce the Secretary's finding and recommendations. A local study covered 524 workers in 22 paramedical occupations in the Greater Boston area. The hospitals covered in the study felt their hiring standards to be satisfactory, although nearly half reported that they had not changed the standards for many occupations for over 10 years. Meanwhile, job content had changed in many cases, and shortages existed in most, if not all, of the occupations surveyed.
>
> The conclusion was that hospitals should reexamine the whole paramedical structure, to determine actual job requirements of each occupation, with hiring standards made relevant to functions actually performed. Considerable overlap in functions was found. Licensed practical nurses, for example, who receive 12 or more months' training, performed many of the functions also performed by nurse aides, who receive only a few weeks of on-the-job training. Greater use of aides and assistants, many of whom can be trained on the job, and development of job-promotion ladders, would tend

to attract better personnel and reduce turnover. While hiring standards must be maintained at the minimum level required to provide needed quality, realistic standards could open many more jobs in health services for the educationally disadvantaged.

Another study examined the job market for paramedical occupations in the Chicago and St. Louis areas in 1963-64. In two occupations - licensed practical nurses and medical technologists - employment had been expanding very rapidly in recent years, but moderate to severe shortages prevailed. Hospitals had not only failed to raise wages, but the authors said, "Some comments of hospital administrators...suggest... cooperation of varying degrees of formality among hospital operators to keep salaries of hospital personnel out of competition." In the case of licensed practical nurses, the St. Louis hospitals had failed to draw upon a large potential source of workers among Negroes in the community, although a large proportion of their employees in this occupation were Negroes.

Very little information on either occupation was available to prospective entrants. Improved dissemination of information, better counseling and guidance, and more active and directed recruitment would improve entry into the two paramedical jobs. Programs should be tailored to particular types of occupational shortages, the authors emphasize - no single solution will apply to all situations."

II. This discussion in the President's report summarizes the problem area reasonably well and provides a preamble for our session.

III. Public Health Service has just recently estimated a current shortage of almost 50,000 physicians, 150,000 nurses, and more than 250,000 allied health personnel.

IV. If we set a goal (which is impossible to attain) of filling these shortages within one year, this means for each working day, we would have to deliver 225 physicians, 700 nurses, and 1135 allied health workers. And this does not include replacements that accrue each day.

V. No wonder we have spiralling medical costs when the supply is so short of the necessary personnel. No wonder service is slow and of low quality. No wonder no one seems concerned with patients as individuals who need personalized attention.

VI. The problem, of course, has been properly identified as a system problem - the health care system, or health care delivery system.

VII. The radiologic technologist field, the reason for this national conference, is one of the prominent allied health professions with a manpower shortage of considerable magnitude. The American College of Radiology estimates this year there is a current shortage of about 50,000 people. Note this is about 20% of the total estimated shortage in the allied health field.

VIII. How can we as a nation proceed to solve the shortage? We have all preached, and been preached at, that all such major problems require the systems analysis approach. Let me here simply say that a proper systems analysis identifies the specific questions which must be answered to develop a solution.

IX. One of the major outputs of a competent systems analysis is a description of the environment - that is, what external factors are at work which affect the problem area. These include such matters as A) current and forecasted economic health of the country, and specifically, the economics of the health "industry," B) the changing social patterns in the society in general, and more specifically, the public values and attitudes toward health care and illness prevention, C) the general and specific manpower and employment trends, and more specifically, the national push for equal employment opportunity for minority groups and disadvantaged populations, the rural-to-urban migration, the location and requirements of jobs, capability of job information systems, and other labor market factors, D) the varieties of legitimate interests of a host of other professions and organizations which interface with the specific field of radiologic technology.

There are a staggering array of complex factors which could be listed: legal factors, health insurance, medicaid and medicare, consumer protection, medical practice traditions and emotions, educational and training approaches in general, technology developments and innovations, federal and state standards, etc.

X. Along with the external factors which create the environment within which the problem solving must take place, let us also note the fundamental problem of leadership. Sustained, long-term, dedicated leadership devoted specifically to the problem area is mandatory. Focusing on the matter of a substantial shortage of radiologic technologist personnel, the identification of the problems and pursuit of answers and solutions requires recognition and acceptance of the fact that full-time leaders are required, who are supported by an adequate staff and dollar resources. Part time "diddling" with the problem on the part of bystanders, observers, and consultants, have never ever solved a major problem. A single-purpose, full-spectrum organized effort is necessary.

XI. Let me now throw out a few of the difficult questions that probably would emerge from an analysis:

   A. What is the definition of a shortage? Is it defined on the basis of the numbers of medical and dental x-ray machines (200,000) in relation to the number of persons currently employed (117,000)? Or is shortage defined by the difference between the numbers who meet the educational criteria for being registered by the American Registry of Radiologic Technologists (60,000) and the total number employed - a difference of about 57,000?

   B. Assuming a definition can be found, where are the specific shortages - at the entry job level, at the senior technologist level, at the chief technologist level, or in other positions in the field?

   C. Do the shortages come from insufficient numbers of qualified applicants for training, from entry standards which have been set too high, from the lack of an adequate number of training institutions or schools, from failure rates that are too high, or from excessively high turnover in the occupations? If turnover is too high, what factors in combination are involved, such as inefficiently designed jobs, lack of career progression opportunities, inadequate supervisory attention, pressure from work overloads, inadequate salary scales, insecurity and fear because of lack of competent training and education, poor working conditions and facilities, etc.

   D. A series of occupational analysis and design questions would likely emerge, such as:

      1. Are all the jobs in the structure optimally designed such that there is a clear career progression continnum involving progressively more challenge, more knowledge and skill, more satisfaction, etc?
      2. Is the entry job designed properly such that new entrants can meet the duty requirements satisfactorily, or have too many diverse tasks been thrown

together, with little or no relation to prior training, etc?

3. Can the entry job be further shredded out such that less education and training is needed for entry and satisfactory performance?

4. Can burdensome tasks be efficiently mechanized to relieve job difficulties, etc.?

E. A series of questions about recruitment and selection would likely emerge, such as:

1. What are the minimum aptitude profiles for the lowest level entry jobs (as measured by job performance rather than simply school performance)?
2. What are the characteristics of successful career technologists compared with those who leave the field?
3. What are the primary sources of successful recruits, such as types of high schools, sections of a city, regions of the country, age at entry, types of educational background, etc.?
4. What types and kinds of recruiting campaigns are successful? How has recruiting been done?

F. A series of education and training questions would likely emerge, such as:

1. Is the training curriculum realistically geared to the occupational requirements? Are graudates from two-year Associate programs "over-educated" and "under-trained" for the entry job?
2. Is the mix between "theory" and "practicum" realistic?
3. Is there sufficient articulation between the occupational requirements and education and training processes throughout the entire structure and the professional career?
4. Is there a sufficient number of schools and training facilities and are these distributed properly geographically?

XII. As I indicated earlier, these are some of the questions that will emerge from the analysis of the manpower problem. Now, some of these have already been identified and addressed through the efforts of the Bureau of Radiological Health, the American Society of Radiologic Technologists, and the Commission on Technologist Affairs of the American College of Radiology. Certainly the effects of the Health Training

Improvement Act of 1970 to provide educational and training assistance to the allied health professions will be most helpful.

XIII. Let me bring your attention for a moment to the special report of the Carnegie Commission on Higher Education, entitled The Open Door Colleges. I want to note some of the major themes of the report.

A. The community college has proved its great worth to American society. Community colleges should be available, within commuting distance, to all persons throughout their lives, except in sparsely populated areas which should be served by residential colleges. This will require 230 to 280 new colleges by 1980...Prospectively more than 95 percent of all Americans will be within commuting distance of a community college.

B. The Carnegie Commission favors the comprehensive community college with academic, occupational, and general education programs as against more specialized two-year colleges. The comprehensive college provides its students with a wider range of options.

C. Community colleges should remain two-year institutions and not expect to become four-year or graduate insitutions. They have an important role to play and should not abandon it.

D. Full transfer rights should be provided qualified graduates of community colleges by comprehensive state colleges and universities. There should be no artificial ceiling for students with proven academic ability and interest.

E. Occupational programs should be given the fullest support and status within community colleges. These programs need to be flexibly geared to the changing requirements of society. The health-service professions, in particular, will be expanding rapidly, and training for many of them can best be given in the community colleges.

F. The Carnegie Commission supports open access to the "open-door" college for all high school graduates and otherwise qualified individuals. The community colleges have a particular role to play in assuring equality of opportunity to all Americans. The Commission, while supporting open access, does not believe that all young people either want higher education or can benefit from it. Many of those who can benefit from higher education and want it would be better off in other endeavors for a time after high school before entering higher education. For this latter group, the community college can stand as a continuing open opportunity over a period of years.

G. The community college should charge no tuition, or low tuition.

H. Guidance-occupational and personal-is a particularly important function for the community college, which serves so many students who are in the process of choosing their lifetime occupations and their life styles. It is an excellent place for those who are uncertain about their careers and about their lives to canvass their opportunities and make their choices.

I. The community college has a special responsibility to enrich the cultural life of its neighborhood and to be an active center for art, music and drama, and intellectual discussions.

J. The Carnegie Commission believes that the optimum size of a community college is 2,000 to 5,000 students. If it is much smaller, it cannot provide a rounded program at reasonable cost. If it is much larger, it will compound unnecessarily the problems of commuting and parking, and it will be less likely to be a part of any single neighborhood. More people can be served more conveniently by several colleges of reasonable size than by one large institution.

K. The community college by the nature of its purposes should relate to its local community and be governed by a local board or, at least, have a local advisory board.

L. Financing should be increased and equitably shared by federal, state, and local governments. In particular, the federal government should provide start-up grants for the additional community colleges needed to provide nationwide coverage.

XIV. I believe the Carnegie report shows clearly that the community college efforts are beginning to pay off, but that we have a lot more work to do in the near future. Certainly this conference is a clear example of the kinds of community and junior college responsibility which has to be met as soon as possible.

XV. Such colleges have always faced the problem of getting competent instructional staff, equipment, and facilities, funding, and sufficient student enrollments. These problems are not new, but new and innovative solutions must be constantly sought. I want to note briefly one project sponsored by my office whose characteristics possibly offer some ideas for adoption in junior colleges affiliated programs. This is Project APSTRAT being conducted by the Human Resources Research Organization at Fort Ord, California. (The details are available from HumRRO). It maximizes individualized training and examinations, with very effective use of training staff and facilities, and allows the full spectrum of aptitudes to be trained in the same curriculum to fixed performance standards.

XVI. However, I want to leave you with a charge to be certain your curricula deals with patient care in its fullest sense. I would want each technologist to have valid, practical, real-life training and experience in dealing with patients' needs across the full range of fears, anxieties, ignorance, etc.

In the May 19, 1970 Senate hearings on the Health Training Improvement Act, there was an interesting interchange involving Senator Yarborough, Senator Cranston and Dr. Egeberg, the Assistant Secretary for Health and Scientific Affairs of HEW.

Senator Cranston:

"First, I want to express my admiration for the way you have been doing so many things and in particular, your emphasis on giving opportunities to returning veterans in the health field. I think it is just great that you are doing that.

I want to express some very deep concerns I have about one aspect of the implementation of the opportunities that exist for allied health professionals and paraprofessionals, and I would like to ask that Dr. Hamburg and others who will testify later to comment on this in my absence, if they would, after their prepared testimony.

Some personal observations and some personal experience that I have had have given me a deep feeling of concern about what we do about one particular thing: The use of allied health professionals and paraprofessionals who have not gone through the total training that doctors and nurses go through to prepare for their responsibilities causes some people to be involved in hospitals and other institutions who have not been given any particular training in bedside manner. They may not be totally aware, just because they have not had adequate training, of the deep emotional, psychological and other problems that people lying in bed in institutions are undergoing.

They lack what we used to have from doctors who had time to use what used to be called the bedside manner. The fact that doctors now are so hurried and so pressed and so specialized that we have perhaps a greater need than ever for other health personnel who are at the bedside or have daily contact with patients to be prepared to render that sort of compassionate assistance to patients who need emotional understanding as they undergo the severe problems inherent in being institutionalized.

I am concerned about an absence of that understanding among people who are now health professionals and paraprofessionals and who are doing various types of work around hospitals. The pending measure suggests-as does the measure that I am working on in relation to veteran hospitals-opportunities for them. Preference will be given in employment to individuals from low income families who would work in the public or nonprofit agencies, institutions, and other health facilities. Those people in turn may have their own particular grievances, and quite justly so, against society because they have had unequal treatment, unequal opportunity. Many of them may just automatically be behaving as human beings do and may be taking out their own feelings of abuse against hospital patients with whom they come in contact.

This can be particularly distressing when it happens within an institution where the patients have other personal grievances due to what is happening to them physically or mentally.

What I wanted to ask you and other witnesses is what do you think can be done to deal with this problem which I think is an immense one? What might we put into this measure and other measures in this field, that would insure that there is an awareness of this problem and that whatever training is possible to prepare allied health professionals and paraprofessionals to deal intelligently and wisely, to the best of their abilities, with this problem is undertaken in the training period?"

Dr. Egeberg: "I am deeply grateful that you are bringing this up to the surface at a hearing like this, Senator Cranston. I think in the days when the teams were smaller that the good physicians and nurses have their impact on the others. I have worked in many public hospitals. I have been amazed how often the patients expressed the warmest gratitude to the ward maid who washes and cleans around the bed and listens to them, who will perhaps arrange a few things, who is very sympathetic with them and who they feel, since she isn't exactly tending them is giving them something free of her time when she does it.

I mention that because this is a quality without which medicine loses, or the health professions lose, what is called their art and they become purely scientific.

I would think that if that could be emphasized in anything having to do with the training of anybody in the health professions it would be useful. The good practitioners of medicine do it by example for their students on the ward. The nurses do the same. But as we get harassed and pressed for time this does get thinner.

And I would think that as we get more people to do the job, and there isn't the extreme pressure to do so much, that our human feelings could come back to the surface again. I can't think of any one thing that would bring this out except that I like to emphasize it. I am glad to hear you emphasizing it. I know Senator Yarborough has referred to it. I think it is part of our human relationship which, if we applied it as we walk around, we wouldn't have quite the schisms that we have today in society at large.

I can only say I am grateful you brought it out. The only expression I think is that if you can in a government vehicle use the word "love" I would use it, because that is the quality that the healers have to have."

Senator Cranston: "It seems to me that we should include something covering this area in the curriculum and specify that in the measure. I will seek to develop language and solicit advice as to how to do it from you and other experts in this field.

On the matter of love. I received a petition about "love" from some veterans in one of the Veterans' hospitals out in California, who are not the sort of people one might expect to use that word after all they have been through. But they were suffering from an absence of adequate interest in their own emotional problems that they felt was needed from those around them in the hospital. They said in a petition to me, "What we need around this place is some love."

Thank you very much for your advice. I wish you would think more specifically as to how we can amend the bill to cover this point."

Dr. Egeberg: "I will do that, sir. And thank you for the opportunity."

The Chairman: "Before you leave, Senator Cranston, in line with what Dr. Egeberg was saying, yesterday in hearing evidence on another bill, a social anthropologist was talking about this loss of community spirit that we had in the age where people lived in town and helped each other with the dehumanizing factors of modern living and technological society in the cities.

They said that one reason these young people move off and live in a commune is that they are grasping for something that has been lost in our society, the kind of thing you mentioned, Dr. Egeberg, how we bring back certain human values that have been lost with this rapid transformation in the kind of society we have now.

He mentioned other things. They said basically the same thing that you said a moment ago, that if we would bring back human factors - they weren't talking about those communes, of course - desire to have some kind of family group affiliation that it would lessen the schisms and the discord in our society that we have now."

Reactor: Israel Light, Ed.D., Dean
School of Related Health Sciences
University of Health Sciences

Dr. Canter's comments make it clear that any discussion of manpower must take into consideration such elements as the raw material available for training, occupational-job-task analysis, educational mobility, credential validity, precise definitions of "shortage," supply and demand, and still other factors.

All of these elements are distinctly related to the conference focus on the junior-community college training of radiologic technologists.

I wish to bring three very basic propositions to your attention, in response to and elaborations of some of Dr. Canter's observations.

First, we must avoid analyzing manpower problems in the form of the "numbers game." We are all involved in educating and training people in the health occupations under the highly questionable assumption that, because there seems to be a need for more of all kinds of health specialists, the mere production of more such people will automatically result in more people receiving more and better health care and service. This assumption has yet to be proven out.

Second, the gap between Academia and the World of Work remains wide. The decision remains firm to equate job eligibility almost exclusively with educational achievement. "Knowledge" is "in" and suddenly "competence" and "skill" are dirty words. Furthermore, tradition persists to reserve and preserve as much as possible of four undergraduate baccalaureate years for general education and the liberal arts, forcing the acquisition of much elementary occupational knowledge and competence into the gradaute years. This accounts for the fact that more than half (conservatively estimated) of all junior college curriculums are not occupationally oriented. For reasons such as this, the going will be rough to "translate" hospital-based radiologic technology programs into the junior college format and still maintain standards of competence and skill.

Third, by the same token and precisely for this reason, Dr. Canter's emphasis on occupational-job-task analysis is very timely and well taken, because I have seen the effort to move the hospital RT program, lock-stock-and barrell, into the junior college, add a few liberal arts courses, and award the Associate in Science diploma or degree. The two environments and formats are different but related, and a compromise must be negotiated.

I recall meeting in New Orleans some two years ago with members of the ACR Committee on Education. I made the following points:

> The required minimum 2,400 hours of practical experience had been determined by having a group of acknowledgedly competent radiologists pool their professional experiences and arbitrarily agree that in 2,400 hours any reasonably intelligent person could learn to perform certain routine procedures adequately.
>
> I further stated that the number 2,400 was guilty until proven innocent because it was just too fat and round and easily divisible.
>
> By professional reckoning, some 5,300 - 5,800 RT's were produced annually.
>
> It seems that 3.5 years represented the "staying power" in the field and that the minimum of two years' training was included.
>
> By simple arithmetic, a reduction of 1/6th or 400 hours, from 2,400 to 2,000 meant that the cumulative savings of 400 hours per student were equivalent to producing at least 1,000 more RT's a year. This was not to be overlooked in view of the massive job attrition and turnover rate in this field.

I hereby reiterate this "pitch", and offer the following additional observation: namely, the requirement of at least 2,400 hours of hospital-based practicum is totally unwarranted; this number should be reduced by at least 800 hours or one-third; and any required minimum number of hours of practical experience should be explained and justified by professional, technical, and rational job analysis techniques.

As the result of a 1967 contract with the ACR, a series of job descriptions and levels of job responsibilities were prepared and distributed in the packet that went to all participants of this conference. I claimed in 1967 and I restate my observation now that this exercise is only a beginning and that no meaningful realignment of job duties can result unless the entire field of radiation is analyzed including the radiologist's job description. "Play any kind of games you wish and shuffle around anyone you wish but don't muscle into the Radiologist's bailiwick" is no longer acceptable.

The medical specialty leadership must also be ready, willing, and able to shelve its traditions and pack its professional baggage long enough to: a) determine how much of what functions, duties, responsibilities, and skills are required to deliver optimum patient care and service in the specialty; b) compare such an inventory with the laundry list of techniques and skills and services currently being delivered; and c) to note the discrepancies and to decide what to do about them.

The statement in the paper by Dahl-Frankel-Crabtree (also furnished all conference participants) to the effect that hospital-based programs will not be considered is unfortunate. With an estimated 92% of all RT's still coming from hospital programs, it is suicidal - as the Nurses have found out - to make believe that as of a certain date all hospital RT programs will shut down and be automatically transferred to junior colleges. It is important for this conference to grapple with the problems involved in translating hospital-trained RT's or programs into junior college equivalencies so that those who wish can secure the Associate in Science RT credential. If, in working out this set of problems, it turns out that the overwhelming majority of people elect the junior college route rather than the hospital-based route, then we may be faced with at least three levels - the x-ray or radiologic aide who is hospital-based and trained, the radiologic technician who is junior college based, and the radiologic technologist who is baccalaureate-trained.

(Parenthetically, I realize that I tread on sensitive ground in suggesting title change. But someone once said that "pride goeth before the fall." This may not be the time to change but you will have to change your title. It is no disgrace to admit that this field is growing and is changing and is developing greater depth, sophistication in knowledge and skill, and greater responsibility. It is unfair and unwise to hide behind an inaccurate title, because the trend is clear and unmistakable for technicians to represent junior college training and the technologist to represent the baccalaureate level. With the passage of time, you may be doing your own field an injustice by trying to "pass" as technologists among fellow allied health specialists who have baccalaureate training.)

MANPOWER NEEDS IN RADIOLOGIC TECHNOLOGY

Reactor: Theodore T. Ott, R.T.
Department of Radiology
UCLA Medical School

For some very interesting statistics that clearly indicate the great effort put forth by radiologic technology in meeting the challenge of providing sufficient manpower to sustain the profession, I refer you to a most recent report published in the Journal of the American Medical Association, "Educational Programs in Areas Allied with Medicine," Volume 214, No. 8, November 23, 1970.

The report indicates that as of August 15, 1970 there were 1,177 AMA approved Radiologic Technology Educational Programs. However, that figure requires some interpretation. While more than 90% of all approved programs are hospital based, a trend noted in 1969 and broadened in 1970 indicates a very gradual shift from hospitals to colleges. The factors influencing this shift are not always readily apparent.

The establishment of an affiliation between the hospital based program and the responsible department of the junior or community college can and does take many forms. Indeed, in attempting to correlate data derived from the 1970 annual reports, the AMA indicated material received "gave support to the suspicion that 'affiliation' is a weasel word." Those of us familiar with the many and varied affiliations in effect would accept that observation as being valid. However, the organization of the majority of such programs are of relatively recent origin and have been accomplished with no real guidelines. Formal written contracts between the hospital and the colleges are now standard procedure in some areas and are being implemented in others. Those contemplating the organization of a community college-hospital affiliated program should investigate this important insurance-like procedure.

Nevertheless, annual reports to the AMA this year indicate almost 40 transferred their administrative bases from hospitals to community colleges. In most instances the hospitals were retained as clinical affiliations. To understand and evaluate this trend it is important to note that what would have been listed previously as several separate programs now becomes one program with several clinical affiliations. Further implementation of college-affiliated programs will bring about a continuing change in the total number of programs reported.

Here we are in conference to consider and discuss community college-affiliated educational programs in Radiologic Technology. Several speakers of various disciplines have already indicated the advantages that will accrue to better patient care, radiology in general, and radiologic technology in particular, if the college affiliated programs increase in scope and number. Carol Kahler presented a remarkable philosophical treatise, based upon strong basic practicalities of the need and methods for implementing such programs. However, one speaker indicated that currently junior college programs are being set up without planning and without consideration for manpower needs and effect upon existing schools, curricula and employment.

I was suddenly propelled back to 1954 and recalled some of the difficulties experienced in Southern California at that time. We were attempting to organize the first junior college affiliated programs. Three technologists and three radiologists took to their respective professional societies a request for approval to organize an affiliated program. The great majority of technologists and radiologists rejected the proposal and severely criticized those 6 poor misguided souls. But we persevered and one year later won reluctant approval for a 'pilot' program. Today in California 30 community colleges offer a two-year degree program with a major in radiologic technology. This has been accomplished largely without guidelines, certainly no direction and generally, over the years, in the face of some resistance.

In the last few years technologists, radiologists and hospital administrators have initiated conferences and planning sessions for the organization of new and additional college-affiliated programs. Therefore, we now find overwhelming acceptance requiring the application of some restraints to assure the organization of sound and properly supported programs. We agree, and strongly so, with those who see only advantages in broadening the shift to college-affiliated programs. However, we do not advocate abandonment of the total hospital program, nor do we forsee such a possibility.

We believe that at this point our professional society should offer, in place of criticism of the admitted variety of affiliations, concrete proposals for more standardization. We also believe our professional society should take a good hard look at the honest labor that has gone into the preparation and planning of the great majority of these affiliated programs, rather than issue a flat statement to the contrary. An excellent example of planning procedures to be followed was provided by Edmond P. Garvey, President of Springfield College, Springfield, Massachusetts, in the form of a complete and detailed listing of "procedures to be followed contingent upon approval by the board of higher education to procede with planning." The planning procedures developed in Massachusetts are identical to those developed and followed in the organization of the 30 college programs in California.

The 1,177 approved programs as of August 15, 1970 have a student capacity of 18,551 or 15.5 students per program. However, these 1,177 programs reported an enrollment of 11,387 students, for an average of only 9.5 students enrolled per program. Here would seem to be an opportunity to increase student enrollment. If we could lessen that spread, 11,000 students enrolled in schools having a capacity to train 18,000, by just one-half, 3,500 additional students would be enrolled.

An enrollment of but 9.6 students per program suggests to most educators a highly expensive and impractical offering. Also, as president Garvey noted, so low a student teacher ratio requires difficult explanations to other faculty members. On the other hand, to those charged with producing, developing and meeting manpower needs, so low a rate of production should appear as fertile ground for program growth and expansion.

In the ten year period 1959-69 to 1969-70 radiologic technology, for all practical purposes, doubled the number of approved programs. This was the result of a conscious and united effort and supported primarily by the American Society of Radiologic Technologists and the tremendous personal efforts of Dr. Bradley Soule to meet and keep up with the recognized and developing manpower needs of the profession. In addition, keep in mind that until 1966, one year programs were approved; but since that date all programs have had to be of two years duration. Even so, a careful study of statistics indicates that in 1960 the 609 approved schools enrolled 4,581 students for an average of 7.5 students per program. Therefore, in four attempts to produce greater numbers of qualified technologists we have made four significant contributions:

> We raised the standards of our education base by increasing the length of training required from one to two years,
>
> We have doubled the number of approved programs which is an achievement not matched by any other allied health profession,
>
> We have increased the number of students enrolled per program,
>
> In 1960 we graduated 2,285 technologists. In 1970 we graduated well over 5,000 technologists and all from two-year programs.

It seems to me that with a minimal amount of help we recognized and met rather well manpower needs. It is now indeed encouraging to note the interest and, I believe, the genuine efforts being extended in our behalf by various governmental agencies, and particularly the Bureau of Radiologic Health.

However, we must continue to exercise control to whatever degree possible. As a result of the first National Conference on X-Ray Technician Training sponsored by the Bureau of Radiological Health, most participants were in agreement regarding two areas of interest developed by the conference; one, there should be another conference, and two, there was no agreement but considerable discussion and, therefore, interest regarding the existence or non-existence of a manpower shortage in radiologic technology.

As reported by the Technical Education Research Center of Cambridge, Massachusetts, estimating future manpower needs in any field is always a hazardous undertaking. Such estimates are not only a function of present data, but are also dependent on future occurences which may be unforeseeable. Whenever calculations are presented for manpower needs, they should be coupled with the assumptions on which they are based. Wherever a variety of assumptions is reasonable, more than one set of estimates is required.

In the past we were able to keep pace with our manpower needs simply by accepting the basic premise that the demand for an occupation will be the major factor in determining the supply of people in that occupation. But the law of supply and demand is only efficient, in point of time, in immediate response situations. The establishment and organization of training programs, the recruitment of applicants, acceptance of students into a two-year curriculum and realization of the final product - the qualified technologist - puts a terrible strain on the law of supply and demand. We must face up to a factor of three years at best, but most probably 5 years as already noted by president Garvey.

Further, and as reported by Russell Morgan in the NACOR Report, there is no sign of leveling off of the rate to which radiological methods are being applied in medicine and defined as a compounded annual rate in excess of seven percent. Another way of putting this is that the doubling need of radiology is less than 10 years. Now consider that the shortage of radiologists is definitely increasing in proportion to the population increase, then consider that more people are receiving more and more medical care, and that more x-ray examinations are being performed per patient, and you know more exposures per examination are being ordered. After all this, we realize additional programs must be organized and increasing numbers of students must be trained and educated. Two questions beg answers: One, how many programs? and two, for how many graduates? These two prime questions can be broken down to many lesser items, but each of almost equal importance. For example - what new direction and teaching innovations should be brought to hospital programs - isn't it time we scrutinize course content and length, both didactic and practicum - what non-radiologic technology curricula would best prepare our students for their future role as leaders and teachers, and to what degree shall affiliations between hospital and college be regulated or required?

It may well be that the increasing number of state licensure programs will point the way and provide answers. We have such an opportunity in California in the preparation of regulations covering all aspects of technologists education, training, curriculum school organization and affiliations. These regulations will implement and become a part of the law for the certification of radiologic technologists. One regulation of interest to a discussion of manpower needs, relates to the required ratio number of senior technologists to students. Under Section III, Faculty, of the AMA Essentials of an Accredited Education Program for Radiologic Technologists, we find there shall be at least one qualified technologist instructor for each three students. The California regulation to take effect July 1, 1971 requires there be one certified technologist for each student. This regulation was found acceptable after considerable discussion and some study. It was found that the great majority of schools do not have one student for each staff technologist. It was also found that as the ratio of students to technologists approaches three, the quality of the final product is adversely affected. The one school known to us as having a ratio of three to one, also suffered, by far, the highest failure rate among Registry applicants in the year past. Our judgment and decision was based upon the need to produce qualified and well trained individuals.

My final comment would be in the form of a plea that as we grapple with the problem of meeting manpower needs (quantity) in the field of radiologic technology, we lose sight of the great need to improve the quality of not only numbers of students yet to come, but of teachers as well, those here and those to come. I firmly believe college-affiliated programs with improved curricula present a signal opportunity to achieve both and to a degree not approached before.

MANPOWER NEEDS IN RADIOLOGIC TECHNOLOGY

Reactor: Harold D. Rosenbaum, M.D.
Professor and Chairman
University of Kentucky Medical Center

An adequate quantity of quality technology manpower for radiology is a primary goal of this workshop. It is accepted that under present operating procedures there are at least local geographic shortages as well as general need for more high quality radiologic technologists. Some of the causes for this manpower shortage and some actions that might alleviate the problem will be discussed briefly. It patently is impossible to discuss Manpower Needs totally divorced from Curriculum, Administration and External Influences, the topics of the other three Workshops.

What considerations explain why more people do not become radiologic technologists and remain active practitioners after registration? There are data to show that the shortage of technology manpower is no more severe in radiology than in other allied health fields. It is unlikely that a significant number of radiologic technologists leave the field because they dislike the work. As a matter of fact, most RT's find their duties satisfying and rather enjoyable. Compensation in radiology for technologists is at least equivalent to most allied health fields. No doubt a significant increase in salaries would have a beneficial effect but it is not the complete answer. Then why are we having problems?

Lack of adequate support, both local and governmental, for radiologic technology training is an important factor. Although this subject infringes upon the Administration and External Influences Workshops, lack of sufficient staff, space and other substantial evidence of support has a severely negative effect. The other workshops doubtless will explore these matters in detail. Such problems are not peculiar to Radiologic Technology but affect all allied health professions. This problem must be overcome if we are to conquer the manpower problems of radiologic technology. A federal health program allegedly designed around a primary objective to improve patient services is extremely shortsighted when it does not fund training programs. Patient care cannot be provided without adequate manpower.

Stature is another important factor negatively affecting recruiting for radiologic technology. This is a very difficult thing to define. I am not referring to the esteem with which the technologist and his work are held by the radiologist. In this respect, the Radiologic Technologist commands a high position which certainly compares favorably with other fields. Reference is made to considerations primarily related to levels of accredited educational achievement. A very small percentage of registered radiologic technologists have a

Bachelor's Degree.

It is readily acknowledged that a Bachelor's Degree is not necessary to become a superb radiologic technologist for were it true we would have very little assistance. There are, however, prestige factors that defy quantitation as well as very tangible benefits which fail to accrue to the individual without a recognized degree. This can be illustrated succinctly by the policies of the military services toward registered radiologic technologists.

As you doubtless know, a registered radiologic technologist receives no commission and is accorded no preferential status when he enters the armed forces. Other allied health personnel with a bachelor's degree enter the military forces as an officer. The stature and prestige consideration is a matter of the accredited educational level which will never be corrected until educational requirements for radiologic technologists are raised.

The picture is not entirely gloomy. Over the past several years I have noted a distinct improvement in the overall quality and sophistication of individuals entering radiologic technology. I cannot, of course, quantitate this impression but I am sure it is true. This improvement has paralleled the steady upgrading of technology training from a past minimal requirement of an apprenticeship toward present planned educational courses. A cause and effect relationship may be operative, at least in part.

It would appear the groundwork is being laid for the usual plea for higher educational standards and more support which means more money among other considerations. These are needed and will help immensely but they are not the total answer.

We hear more and more - and more convincingly - that changes must be instituted in our system of purveying medical service if the health needs of our people are to be met. It is evident that there are more efficient methods to provide radiologic services. Both technologists and radiologists spend much time performing duties which could be performed by individuals with less training. It is possible to train individuals in a relatively short period of time to provide many facets of "today's medicine."

Extensive training is not necessary nor is a massive amount of theoretical knowledge required if the individual only performs accepted standardized tasks. The NACOR report left little doubt we will not be able to produce a sufficient number of physician radiologists to meet national requirements. Many duties of the radiologist could be delegated to specially trained radiologic technologists. A program to define these duties and to test the premise of the preceding statement is under way at the University of Kentucky. This program may offer the radiologic technologist another avenue for advancement to a position of greater responsibility and more financial remuneration and should make the field more attractive.

Less has been said about the activities of a radiologic technologist. I am convinced that the RT is similarly overtrained for many duties he performs. It has been shown that a technologist spends less than a third of his time performing duties such as positioning the patient and selecting exposure factors for which he is specifically trained. His other duties easily could be assumed by lesser trained individuals. I have specific reference to such things as getting the patient undressed and dressed, placing the patient on the radiographic table in the primary position, transporting requisitions and cassetts, aiding in fluoroscopy, and so forth. An efficient radiologic technologist, by the use of one or two such assistants, easily could service two routine diagnostic radiologic rooms. This would greatly increase efficiency and significantly reduce the need for additional highly trained radiologic technologists in facilities with many diagnostic units. It would also provide an important lower occupational level for which individuals with lesser potential and minimal training could qualify. The University of Kentucky is attempting to obtain support from the Office of Economic Opportunity to train such individuals.

Let me hasten to say that most of the important advances in medicine and radiology will continue to come from broadly trained physicians and radiologic technologists who can communicate in many scientific disciplines. In other words, we always will require thoroughly trained physician radiologists and radiologic technologists.

So far I have recommended more support for radiologic technology, higher educational requirements, more efficient operation of radiology departments and two additional vocational levels. This does little to simplify the situation. An orderly progressive concept of training programs and occupational levels is essential. The Workshop on Curriculum will deal with matters such as a core curriculum and occupational mobility. The core curriculum, a knotty problem, is left entirely to them but I would like to heartily endorse a professional tree or ladder for the radiation sciences. It is essential that we pursue this matter with vigor. It has educational implications far beyond the field of radiology.

The needs for a vocational tree are well known. As you all appreciate, most training programs in the health sciences are "dead ended." It usually is impossible to shift from one field to another, even if they are closely related, without going back to the very first and commencing training again at the lowest level. Similarly, it is impossible to aspire to a higher level of responsibility and remuneration by "adding on" advanced training. In other words, allied health professions offer little mobility in either a lateral or a vertical direction.

It is possible to construct levels of professional responsibility, and corresponding training programs, for the radiation sciences that build one upon the other. Such a scheme would permit an individual to move upward on the professional ladder or, indeed, transfer laterally if his aspirations lead him in that direction. I have spent some time constructing the rudiments of such a ladder.

Many problems attend the introduction of educational programs and occupational levels to implement such changes.

> No university is prepared at the moment to accredit all the types of training programs such a scheme would require. Appropriate entreaties and adequate funding in all likelihood eventually would overcome this problem.
>
> Governmental agencies and professional societies are not ready to sanction or to totally accept individuals to perform the duties tacitly implied. This is no cause for despair since social order responds to social needs. If there is, indeed, a need acceptance will be forthcoming.
>
> It would be necessary to develop a method to evaluate an individual's competency if he chooses either to transfer horizontally or to proceed vertically. Just because a person once passed a course is no guarantee he maintains proficiency. Of course, if he is performing an activity adequately even without possessing the usual academic measures of acceptability (meaning the ability to pass standard examinations on required subjects), questions can be raised concerning the necessity of the subject material or the measuring procedures. Mechanisms must be developed to recognize and to measure knowledge and ability gained outside didactic training. There are organizations with expertise in this field.
>
> Job descriptions, training programs, levels of responsibility and many other matters would have to be defined and detailed. It is a prodigious undertaking that will require a great deal of time from many people. Nevertheless, I believe it is the direction in which we must move. A professional ladder which incorporates lateral and vertical mobility has immense and attractive possibilities. Radiology should not turn away from this possibility, indeed this responsibility.

I would like to close by mentioning three matters that relate to Manpower Needs and deserve attention. One is stipends for radiologic technology students. There are important legal considerations involved in this problem. The future may see stipends being required for all allied health personnel during the period when they, like interns, are involved in actual clinical service. The second matter relates to curriculum and, with apologies to the curriculum workshop it is suggested that the requirement for 2200 hours of practicum be reviewed. 2200 hours represent 55 forty-hour weeks. This much may not be essential. Lastly, there is a need to determine the individual attributes that lead to a successful career in radiologic technology. This will become increasingly important in recruiting and counseling as the pool of applicants grows.

Much time has been spent reciting problems and suggesting a few courses we might pursue to find solutions. Radiologic technology has an excellent opportunity to move ahead in educational programs and occupational definitions if ingenuity is applied to the problems we face. Constructive moves in this direction might very well be the vanguard of an advance which will effectively upgrade training and patient services not only in radiologic technology but in all of the allied health professions.

MANPOWER WORKSHOP REPORT

OVERVIEW

The following report on manpower has been treated in the context of the stated premise of the Conference: a concern for college affiliated two-year programs. No specific concerns for hospital or four year baccalaureate programs are expressed, although they have been considered as factors impinging on community college programs.

It is understood that problems of health care in the United States must be approached on a systems basis; the study of manpower requirements is only a small part of the analysis, but an important one. It addresses itself to needs in terms of quality and sufficient number of personnel to perform services consistent with the requirements of good health care.

These needs are expressed in four specific areas: manpower availability, recruitment, entrance requirements to colleges and support for enrolled students.

Dr. Ralph Canter, Director for Manpower Research, Office of Assistant Secretary of Defense, has pointed to what he describes as a fundamental problem in the allied health profession: the need for leadership. The points contained in this report are designed to provide guidance to stimulate leadership in one area of that structure: radiologic technology.

Although this report necessarily focuses on details of policies, procedures and problems, it should be emphasized that all considerations are pointed in one direction: the patient as a human being whose health needs in a complex society must be met by quality care and a concern for the individual.

SUPPLYING MANPOWER FOR RADIOLOGIC TECHNOLOGY
(Raw Material)

The establishment of any community college affiliated program in radiologic technology is surrounded by many constraints, not the least of which is supply of students to be educated to meet a real and future need. With respect to the need, there is a very real lack of hard data on the numbers and types required. One can surmise that with the expected expansion of the health care delivery system, there will be a need for individuals qualified to fill positions in the administrative and teaching areas as well as staff technologists.

The absence of the aforementioned concrete and reliable data on demands which can be interfaced with an expected supply makes any recommendation at this time speculative. Incidental information indicates that in some regions, there is an oversupply while in others, an undersupply. This leads to the conclusion that there is a need to look at the supply-demand problem on a region, state-by-region basis rather than on a national basis.

Assumptions

Assuming a continuing demand for trained R.T. personnel, the number of qualified candidates interested in pursuing a course of study in radiologic technology is not adequate to meet the anticipated future demands. Our reasons for this statement are:

> Lack of stature of the radiologic technologist in the eyes of the medical profession.
>
> The relatively poor image with which the field of radiologic technology is viewed by guidance counselors, educators, parents and segments of the general public.
>
> The generally inadequate financial remuneration and relatively low salary potential.
>
> Lack of sufficient numbers of programs in higher education leading to associate degree or higher.
>
> Lack of active national, state and local recruitment practice.

Program

Correction of the above is imperative if an adequate student supply is to be developed. We recommend to the American College of Radiology: 1) a recruitment policy be developed and implemented on a continuing basis by the appropriate professional organizations, government agencies, hospitals and the educational community; 2) a high visibility public relations campaign; 3) a program designed to orient guidance counselors and teachers to the career opportunities in the field; 4) that previous salary studies be updated and that salary adjustments be made in order to make them competitive with other occupations requiring comparable education and experience; 5) that the medical community be encouraged to re-evaluate its attitude toward the radiologic technology specialty; 6) that a firm data base of supply and demand be developed on a regional (state) basis which can be used to evaluate the need for additional higher educational programs in the field. It is thought possible that leadership in this be provided through the regional medical program. Such a data base should go beyond numbers and include radiologic technologists profiles, student profiles and mobility patterns; and 7) that educational institutions be encouraged to design programs to serve as a base for future career advancement through the continuing educational focuses.

Recommendation: Compare hospital and college students in developing different profiles; keep records on continuing basis; no survey.

RECRUITMENT

Candidates to be recruited will be high school graduates or the equivalent. The main course of students will undoubtedly be recent high school graduates. Discharged veterans, radiologic technologists with no collegiate backgrounds, housewives liberated from child rearing, and inactive technologists who may require some retraining.

Prospective students with inadequate preparation should be counseled and guided into appropriate remedial courses to prepare them for radiologic technology curriculum.

Career oriented students without regard to age should be considered. Educability and post graduation productivity must be considered.

No special high school curriculum is required, although it is recommended that certain basic science courses be included. Students must be physically qualified for the occupation.

The U. S. Department of Labor test currently available is not considered valid. If, and when, a suitable test is available, it should be utilized.

The basic diagnostic radiologic technology program is the source of not only staff technologists but also, in the long run, those individuals who will advance to key positions in the profession. These latter individuals will require a considerably greater capacity than the staff technologist. Recruitment must be directed to meeting both objectives.

Assumptions

There is an uncertainty in regard to the overall quantity of graduates required. Current national estimates need to be refined.

Geographic shortages of technologists are recognized.

The need for a higher quality graduate is generally recognized. This is especially evident in regard to technologist administrators and teachers who are now in short supply.

Goals

Recruitment of sufficient number of qualified students to insure an adequate supply of technologists.

The number recruited must be sufficient to compensate for the attrition, probably considerable in an open admission college program.

Program

Local programs must be developed. Cooperation with all other interested groups and health career organizations is encouraged and may be possible, and a variety of approaches may be used. Technologist associations, medical and radiologic associations, medical and hospital auxiliaries are among the groups who should know of your program and whose aid may be enlisted. Alumni groups of technologist programs should not be neglected. Some of the above may have scholarship programs that might be directed toward support of a radiologic technology student.

The high school and junior high school counselors should be cultivated and appropriately oriented.

Career days, health fairs and other gatherings where such exhibits are profitable and where interested parties will be in attendance, should be utilized to the maximum extent possible.

Through the above, the interested parties should be identified and visits to hospital radiology departments should be arranged.

Radiologically oriented demonstrations should be offered and made available to science classes and to youth associations.

The national effort should be directed to the production of television programs, radio programs, motion pictures, film strips, brochures and pamphlets directed toward a wide audience. Some of these should be useful and could be coordinated with local efforts above. Support from commercial sources, government and national societies will be required. Some brochures and motion pictures are already available. The development of such programs will require consultation with experts who have experience in advertising.

A related matter too broad for consideration in this presentation is the image of radiologic technology. That there is a need and place for male technologists deserves emphasis. Effectiveness of recruitment will be influenced by the quality of this image. The image needs to be enhanced. The national program preparation should keep this in mind. It might be possible to somehow get a medical television series, or several series if possible, to "glorify" the role of the technologist in one of their presentations. In this regard, cognizance should be taken of the possibilities for lateral and vertical mobility within the allied health field and that these possibilities be brought to the attention of affiliated colleges.

Recommendations

A study based on hard data is needed to evaluate the number of radiologic technologist program graduates required. This data should be based on local or regional concerns.

A test which should determine characteristics of the good radiologic technology practitioner is needed, particularly in the selection of students. A study of this matter is strongly recommended.

Unresolved Issues

The need for technologists will be influenced by a variety of contingencies. Their collective impact is speculative and in consequence, the technologist requirement is uncertain.

Hospital based programs now in existence train the majority of technologists. It seems most probably that many such programs will be incorporated into college centered programs.

In time a decision may be required in regard to the continuation of hospital based program. However, since at present a majority of students are the products of hospital programs, the consideration of this problem would seem best deferred until a more substantial proportion of technologists is graduated by the college programs.

ENTRANCE REQUIREMENTS

Considerations

Among the manpower considerations in the radiologic technology field are those of requirements of entrance to both the community college program and the practice of radiologic technology.

Assumptions

A basic assumption relates to competence. The minimum standard of competence for practice in radiologic technology shall be represented by ARRT registration or equivalent.

Objective

The objective is the selection of individuals who present the potential for successfully completing an approved program in radiologic technology.

Program

For entrance to community radiologic technology, we recommend the use of increasingly flexible methods and measures of student potential. A variety of screening and evaluative measures should be utilized such as aptitude testing, personality and interest inventories, evidences of motivation, high school science interests, high school graduation, or its equivalency, letters of recommendation, personal interviews, educational equivalencies for on-the-job experiences, etc.

As a consequence of increased flexibility, remediation in the basic mathematic and communications skills may be necessary in order to complete the program without compromising standards. Such remediation services should be readily available. Mastery of all basic skills should be required preferably prior to admission. However, if the curriculum permits, some remediation might also be provided early in the first year of study. Recommended for research is a series of studies to identify the occupational characteristics of the radiologic technologist.

Two added recommendations are presented.

First, both as a requirement to practice in the field of radiologic technology and as a community college program requirement, it is recommended that, in addition to knowledge and competence, the student is expected to acquire effective skills in interpersonal communications insofar as the patient is the object of care and attention.

Second, among institutional requirements for the establishment of radiologic technology programs, the community college should explore and utilize all possible local and regional resources for identifying long-term need for radiologic technologists. In addition, any identified radiologic technology manpower need should be balanced against the college's resources, expertise, program costs, minimum number of students to justify establishment, etc.

STUDENT SUPPORT

Drop-out rates in many existing community college radiologic technology programs are unacceptably high, particularly in the first year, because of a lack of financial resources and the scholastic deficiencies of students. The need to minimize drop-out rates through student support programs may aid in solving the manpower problem.

Assumptions

The nature of radiologic technology programs denies students opportunities for summer and part-time employment and may extend beyond the normal two-year community college program. This necessitates that some special financial arrangements be made for students.

The nature of radiologic technology may attract a number of students with deficiencies in their earlier scholastic background, resulting in their needing special remedial and counseling services to enhance their chances of success. This is especially true in colleges located in areas with disadvantaged peoples.

Goal

Support programs should be established at community colleges to minimize drop-outs.

Program

A. Radiologic technology programs must have adequate counseling and guidance services for students, beginning with recruitment and through to graduation and placement.

1) During recruitment, there should be an orientation to the role of technologists in the medical community.

2) At the time of admission, students should be screened to determine the need for remedial education and/or financial assistance. Provision should be made for orientation through visits to hospital radiology departments and personal meetings with practicing technologists.

3) Continued counseling for enrolled students should be provided to help students evaluate their progress, at least on an annual basis. Concurrently, additional counseling should be provided to help resolve personal, academic and financial problems; community college assistance in resolving interpersonal problems between students and staff in affiliated hospitals; and an orientation to professional ethics.

4) Counseling and tutoring on an individual basis should be provided to help students successfully complete programs on instruction and examinations for certification and to obtain employment.

B. A complete study program for individual students should be developed upon entry into community college programs. This should include the normal program requirements, needs for remedial coursework, continuing counseling and special tutoring.

C. Arrangements for legitimate financial support should be made.

1) Full use should be made of potential funding sources such as OEO, HUD, Model Cities Program, HEW Office of Education and the Manpower Development Program of the Department of Labor. Private sources, such as scholarship funds, should also be considered.

2) Hospital stipends are suggested, especially where normal summer or part-time work is not practical or where students are required to serve an "internship" following college graduation. Stipends should be uniform within an affiliated college program. Financial need should not be relevant to qualify for a stipend.

D. Colleges should be encouraged to provide opportunities for recognizing previous radiologic technology background, including Armed Service experience in radiologic technology. Credit by examination procedure should be utilized.

Recommendations for Research and Study

Survey and evaluation of existing financial situations of radiologic technology community college students, including the prevalence of outside employment of students and the provision of stipends.

Development of model form for agreement between community colleges and hospitals.

Development of appropriate aptitude tests and interest inventories for radiologic technology.

Unresolved Problems

Considerations of student liability during periods of practicum experience.

EXTERNAL INFLUENCES WORKSHOP

External Influences related to such factors as accreditation of the programs, certification of the students, existing state laws and government regulations, professional and community attitudes and opinions, and the employability prospects as students and as graduates.

EXTERNAL INFLUENCES WORKSHOP

Workshop Moderator	Flynn, John Educational Consultant Ontario Department of Education
Overview Speaker	Frey, Donald C., Ph.D., Executive Director Health Careers Council of Illinois
Reactors	Tumelty, Robert, Dr. P.H. Governors State University
	McTernan, Edmund J. State University of New York at Stony Brook
	Koenig, George F., R.T. University of Tennessee
Special Resource Speakers.	Miller, Jerry W., Associate Director National Commission on Accreditations (No formal presentation)
	Brown, Mark, M.D. Talmadge Memorial Hospital (No formal presentation)
	Goldman, Howard, L.X.T. State of New York, Department of Health
	Williams, Mrs. Eunice W., Executive Director American Radiography Technologists (No formal presentation)
Recorders (Bureau of Radiological Health Personnel)	
	Barnett, Mark, Chief Technical Training Services
	Hansen, Wayne, Ph.D., Instructor Rockville Training Section

Other Workshop Participants:

- Dr. Warren Ball
- Mr. Robert Best
- Dr. Raymond E. Bishop
- Dr. William Cole
- Mr. Bobby Dillard
- Mr. Joseph M. Hardman
- Miss Mary Ellen Hughes
- Dr. Simon Kinsman
- Mr. Jerome Levine
- Mr. Roland C. McGowan
- Dr. James W. Miller
- Dr. James B. Monaghan
- Mr. James Ohnysty
- Dr. John Proffitt
- Mr. John Schaeflien
- Miss Kay Shriver
- Dr. A. Bradley Soule

EXTERNAL INFLUENCES ON COLLEGE RADIOLOGIC TECHNOLOGY PROGRAMS

Overview Speaker: Don C. Frey, Ph.D.
Executive Director
Health Careers Council of Illinois

At the outset we must recognize that in an increasingly interdependent world, everything affects everything else, so our opening question is really: What are the most important external trends that will affect college-affiliated radiologic technology programs?

And, since it is in the nature of external influences to force change upon you, rather than otherwise, the function of this workshop ought to be to identify those forces present in the worlds of health and education which require policy consideration on the part of the individual program, and on the RT education field as a whole, and then suggest means of dealing with each force.

I recognize that there are those who say the whole world is wrong, defying the lightning of the Gods and the temper of the times. However, I hope that will not be the outcome of this workshop. Let's leave that kind of "it-shall-not-come-to-pass" reasoning to those elements in health and education who have made it a way of life. And, just in case you haven't noticed, societal trends of ten years ago that were not going to affect the health field have perhaps affected it more than most other areas of endeavor.

Before I get to what is really an annotated shopping list of external forces which we might consider, I would like to make a general observation about the temper of the times -- a thread which runs through all the external influences.

We live in an increasingly inter-disciplinary world -- particularly in the fields of health and education.

Education and/or training for the health fields has moved beyond the walls of the clinical facility into a sometimes-reluctant partnership with education. Neither participant can get along without the other. Individual or specific programs, such as RT, are already finding themselves involved with training programs in other fields, and this is going to increase. And, signs point to involvement of the community at large as well. Manpower training and opportunity are social questions as well as health and educational ones.

The burden of proof is already upon those who insist that they can only work within the framework of their field, or their institution -- or even their combination of institutions.

It may be significant to note here that I'm prejudiced. I represent an early (1963) experiment in the inter-disciplinary approach to the problem of health manpower. It might also be significant to note that this idea must have something. Of the seventy invitees to this conference who are not employees of the federal government -- distinguished people from all over the United States -- four, two radiologic techs and two generalists, are board members, not just connections, of the Health Careers Council of Illinois.

About a year ago I was on the faculty of the Chicago Institute of Medicine's Annual Conference, and on the afternoon where I got to scatter a few pearls, two other speakers were an officer of the Student Health Organization and the dean of a New York Medical School. The medical student told us everything that was wrong with medical education and the necessity for revolutionary changes. Then the Dean, in a rather thick establishment accent with a Vienna flavor, gave an analysis of what is wrong with medical education, how it got that way in the pursuit of something that was "right" in 1910 -- and, "one, two, three, four . . .", the changes that we are going to have to make it bring it up to date. His talk was about twenty times as revolutionary as the student's (illustrating one of Shaw's Maxims for Revolutionaries: "The most distinguished persons become more revolutionary as they grow older, though they are commonly supposed to become more conservative, owing to their loss of faith in convention methods of reform.") I won't go into the details, but one thing he said stuck with me: Solving the problem of medical education depends upon our ability to predict what medical practice will be like twenty years from now.

Well, that's our problem for the next couple of days, "predicting" what effect our changing external influences will have on college based programs in radiologic technology, and giving the field some criteria for dealing with the changes that are here or coming.

Now to my annotated shopping list (for purposes of the written speech, the "annotation" is much condensed, almost reduced to shorthand suggestion in some cases):

For purposes of organization I have divided our external influences into three categories, manpower supply trends, educational trends, and employment or system trends. All of them affect each other and the college affiliated RT programs, and this relationship is charted below. The dotted line; arrows running from the RT programs to the external influences merely indicate my earlier statement that external forces tend to change you rather than the reverse. We must not discount the possibility, however, that we may have among us the genius to discover methods of such universal applicability that the RT tail may indeed wag the health system dog.

Manpower Supply Trends

We live in a "service" economy. Employment in the service industries, as opposed to the production industries, now occupies the energies of 60% of the work force, and this will increase to 80% in the next twenty years. When health and education were all the service industries there were, and most people made their living producing goods, these industries pretty much established their own rules. However, when employment in service becomes the norm for the bulk of the population, then general industry trends will affect health and education as well.

Career Choice Problems. The confusing nature of the modern technological service world of work - as opposed to yesterday's "I grow corn" or "I make widgets" - makes vocational exploration a special problem for young people. This coupled with the fact that most gain little opportunity for observing the world of work necessitates far more in the way of outreach by an industry to provide prospective workers with the opportunity to see if this is, indeed, the right field for them. I have a whole speech* on this subject, but it boils down to cutting your drop-out rate by recruiting people who know what it is they're getting into.

The "Second Career" Phenomenon. The changing nature of our society produces technological unemployment and other job changing situations (the housewife coming back into the labor market, e.g.). Over twenty percent of the students in two-year associate degree programs are past thirty. This could also be true of the students in two-year RT programs of the future.

Career Mobility. The problem of providing basic and even advanced education which allows career flexibility and mobility within the health service fields - both vertical and horizontal mobility, what J. Warren Perry, former president of ASAHP calls the "jungle gym" concept of the career ladder. Wrapped up in this are such questions as providing equivalency credit for knowledge and skills, regardless of how obtained. Current focus is on military corpsmen, but many people in the health field already, aides, graduates of commercial schools, and others deserving of the chance to maximize their potential without undue penalty-as is now the situation.

Getting People Qualified to Enter. . .The thrust to do something about the educationally or economically disadvantaged person who needs compensatory education to make it in health field training programs. Done, hopefully, by building compensation into the regular training program wherever possible, rather than through demeaning and expensive "bonehead" programs which place all the motivational burden on the student, since his goal is not in daily evidence.

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*"Techniques and Organization for Recruitment The Quest for Candidate Quality." Association of Schools of Allied Health Professions, Nov. 23, 1970.

Educational Trends

Institutional Pressures. One might almost say, "keeping-up-with-the-educational-Joneses" pressures, the current fashions in education - although in this case they have considerably more logic and appeal than the midi-skirt. This includes such things as the financial and educational necessity for core curriculum - and RT directors are going to be under considerable pressure to establish commonalities with the other health fields so that as much instruction as possible can take place in joint learning situations - for educational efficiency and career mobility. It also includes all the new forces of technology, the hardware of audio-visual programmed and computerized instructions, and the software of new methodology.

Inter-Institutional Trends. The movement toward some form of joint accreditation body for health programs, as administrators become more and more impatient with the conflicting demands of many separate accrediting associations.

State Boards of Higher Education. Here there is a strong thrust to introduce systemization into the entire higher educational process. Boards and those components which treat with education for the health fields are in transition, from mere review and funding approval bodies of the programs the educational institutions propose, to true planning entities which will initiate programs as part of an overall framework for development. They are attempting to equate social needs with the system of education, and the demands of one segment of the educational system are going to be weighed against the system as a whole and the needs of the world of work and service -- regardless of the utility of a particular program (Post Conference Case in Point: As a member of such a body, despite our present and projected need for radiologic personnel, I doubt seriously if I could vote to approve the kind of expenditure called for in the administrative group for each of the twelve two-year RT programs in Illinois. All of our other needs, and the possibility that a $100,000 laboratory is not essential in each case, preclude this.)

Federal Policy. All of the implications of the Health Professional Personnel Training Improvement Act of 1970, as discussed yesterday.

Employment or Systems Trends

Economics. How much do the arguments over health care costs affect college-based programs? The influences of all the third party payers, public and private, on the system. In this area (economics) we do know as well, that RTs generally are the lowest paid of health workers with comparable education. In Illinois over the last ten years RTs have not only kept pace with advances in nurses' salaries, they have fallen from the position of making average higher monthly salaries than nurses to making lower monthly salaries. I would like to point out that while RTs are usually paid by the hospital, their salary levels are usually influenced by physicians, whereas nursing salaries are generally a decision of hospital administration. There is a parallel situation, concerning both wage rises and decision locus, in the medical laboratory, although it is not as that of RT.

Technologic Change. Here we have the situation where "prediction" is vital. What changes are likely and how can the individual program adapt. Obviously you can't wait until change comes before altering the educational process, but you can't move too soon either.

Management. This is at least a question of technological change - in this case technology of management. In all probability we are going to see unit managers reporting to administration, persons skilled in the use of people, scheduling of work and supply, etc., working in radiologic and other departments. Some of these may well be RTs, but others, where managerial skill is not present, will come from management training programs of roughly the two-year associate degree level. Also, we are quite likely to see management making certain requests of education in terms of their own defined needs. To quote from Anthony Robbins, M.D., M.P.A., Fellow at the Center for Community Health and Medical Care of Harvard Medical School:

> "For example, the one large university radiologic technologist training program I know of is located at 50 hospitals. The curriculum for this hospital-based training was adopted directly from the AMA-approved version. No consideration seems to have been given to particular needs of the hospitals. It is curious, but not at all unusual, that a program which results in most of the employment of RTs in nearby hospitals was not significantly influenced by the hospital administration, but was directed by the school, the radiologic technologists and the radiologists."*

Delivery System Change. Are RTs going to be working in large numbers in entities strikingly different from present acute care departments? I'm referring here to the Health Maintenance Organization systems which had their genesis in Kaiser-Permanente and other pre-pay "capitation" plans and are now the future goal policy of such organizations as the American Hospital Association (e.g. the Perloff Report).

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*Robbins, Anthony. Allied Health Manpower. Inquiry, Volume VII, No. 1 (March 1970).

Licensure Reform or "Hershey wants to let down the bars." Referring to Nathan Hershey, professor of health law at the University of Pittsburgh, who has been most influential. A summation of at least one aspect of his philosophy is the concept of institutional licensure, removing the requirement for individual licensure within the framework of a major institution, making the institution responsible for standards. Forerunners of this are the current positions of AMA and AHA calling for a moratorium on licensure.

What we have is a clash between the desire for quality and standardization (licensure) by the individual professions (mostly from the laudable desire for patient safety) and the desire for a health delivery system which will allow maximum flexibility in the use of manpower - depending for its safeguard on evaluation of "product quality."

This is beautifully delineated in Eli Ginzberg's newest book, "Men, Money and Medicine."* And Ginzberg's thinking probably is the most influential on the present administration in this area. Question: Does a college-based program have any business in this clash? Or is it in the position of the bone over which two dogs are fighting?

Planning. This may or may not be the "Age of Aquarius," but it is certainly the age of planning. Current Federal Programs, such as Comprehensive Health Planning under PL 89-749 and 90-174, and the Regional Medical Programs under PL 89-239, are certainly going to influence education as a component of area wide and local planning. Certainly no RT program should let itself remain unaware of the activities of its own local planning organization.

Conclusion - Some Questions

Are there other important factors?

If so, what else should be included?

Are some of these things too remote - beyond the scope of a college RT program? If so, then we should merely note their existence in our report.

With the remainder, what are the specific recommendations we can provide to guide individual programs and the field generally in dealing with them?

We are providing guidance in dealing with the "pain of change," - change is the name of the game. We are here because of change and we all know how painful it has been so far.

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*Columbia U. Press, 1970.

There is a building downtown about halfway between the White House and the Capitol which contains the national archives. Over the door are carved the words "What is Past is Prologue." Washington legend says that a taxi driver's interpretation of this was "you ain't seen nothin' yet." I believe that. Let's come up with some effective criteria to help our programs meet the challenge.

Reactor: Robert E. Tumelty, Dr.P.H., Director of Academic Development and Professor of Health Science of the College of Environmental and Applied Science, Governors State University

The preface to the 1966 National Conference on X-ray Technician Training states that the central focus of the meeting was the question: "What will it take to provide adequate numbers of appropriately qualified operators of x-ray machines in medicine?"

Implicit in the statement is the simplistic underlayment of a supply/demand model for the education of adequate numbers of x-ray technologists for the medical care market place. The x-ray technologist was viewed or perceived as a unit of production and the concern was with those factors which would insure an adequate and appropriate number of personnel. At that time, even today, many of our concerns are legitimately concerned with what we call the "health manpower shortage."

One of my purposes here this morning is to modify this simplistic concept of supply/demand relationships and to substitute in its place a new model for the provision of adequate numbers and appropriately trained radiologic technologists for the medical care market place. My first major point is, why should we tend to substitute a new model for the simplistic concept of a direct demand/supply relationship for the education of the radiologic technologists?

Two significant trends have occurred since the planning and conduct of the 1966 meeting. First, we have had a proliferation in the amount and types of services that the radiologist and his support staff can provide to people. I will not elucidate on these trends and changes. They are much better known to you people who are technologists and radiologists. The second trend has to do with the delegation of patient care responsibilities of persons with less than M.D. training. Two examples of the accelerated trend toward the delegation of responsibilities are best exemplified by a television program and a newspaper advertisement. On Sunday evening, December 6, a network television program, "The Bold Ones," focused its hour-long program on the problems of a returned medical corpsman who was perceived by people in his community as a physician and the problems he encountered in attempting to save the lives of people. The following Monday morning, December 7, the Chicago Tribune carried a full-page advertisement sponsored by Blue Cross/Blue Shield, and the purpose of this advertisement was to apprise the public of the new kind of person called the physician's assistant. These, of course, are popularized examples of a fundamental adaptation. This factor (i.e., the adaptation) was of little practical consequence in 1966 but is a living reality today.

The second major point of my presentation is to substitute for the supply/demand model, a new model, or if you will, a series of strategies for the education of the radiologic technologist and related personnel. Let me list these strategies:

Strategy One - As there is little doubt of the real need to educate adequate numbers of qualified radiologic technologists, let's call Strategy One an order maintaining approach. This approach dictates continuance of all current educational programs for radiologic technologists and related types of persons who are not yet classified or clearly specified. I fully support the job descriptions which I assume have been developed by the American College of Radiology and the American Society of Radiologic Technologists which describes a continuum ranging from 1) the staff radiologic technologists to 2) the senior radiologic technologist, etc. to 3) the assistant chief and supervisor radiologic technologist to 4) the technical director of education in radiologic technology to 5) the chief radiologic technologist to 6) the administrative assistant to the radiologist.

This kind of career description is commendable, and vitally needed, but I maintain it will not solve problems which are apparent to all of us who are concerned with the education of people in the health care field.

Strategy Two - Could be called the innovative, experimental approach. In this strategy, all of us should take the responsibility to innovate, to improvise and to challange the usual ways in which we are educating radiologic technologists and similar types of persons. We should challenge the usual patterns of our educational institutions. We should also challenge accrediting and licensing bodies and others who hold responsibility for the setting of education and practice standards.

Let me give several examples of what outcomes we may expect from this innovative, experimental approach - ones that fall easily to mind. At Lutheran General Hospital in Park Ridge, Illinois where I am involved in a research study, we have a medical student from the University of Illinois who has never completed a formal course in that University's School of Medicine. Essentially, he is in his fourth year of medical school training. Operationally, he is in his first year of residency in his chosen field of internal medicine. He has never had, and hopefully will never have to undergo an "internship," the one to two year settling-in period subsequent to the award of the M.D. degree. How did he arrive here? He is a "trial run" preceptor-trained student who through the guidance of several faculty members at the University of Illinois has been able to reduce his period of medical school education by at least two years. Let me suggest another example of how we tend to "box ourselves in a corner" in the name of raising educational standards.

In the State of Illinois, where I work and live, a master's degree in nursing is required for the director of nursing education in a community college, where the graduates are conferred an Associate of Arts degree or an Associate of Science in Nursing. To me it is patently absurd to require absolutely a particular level of degree in order for a person to be a teacher in such a collegiate-level institution. With respect to educational innovation, earlier in the conference we heard Dr. Carol Kahler address herself to certain educational problems. She cited the work of Dr. Benjamin S. Bloom, Professor of Education, University of Chicago.

I might add that most of our institutions of higher learning are admirably unprepared to activate the "learning for mastery concept" of Dr. Bloom. Our unwavering intransigent quarter or semester systems preclude the possibility of applying Dr. Bloom's finding in our current curricula. Innovation and experimentation will be supported (even by some of the most conservative groups) if we really put ourselves into the position to justify our position.

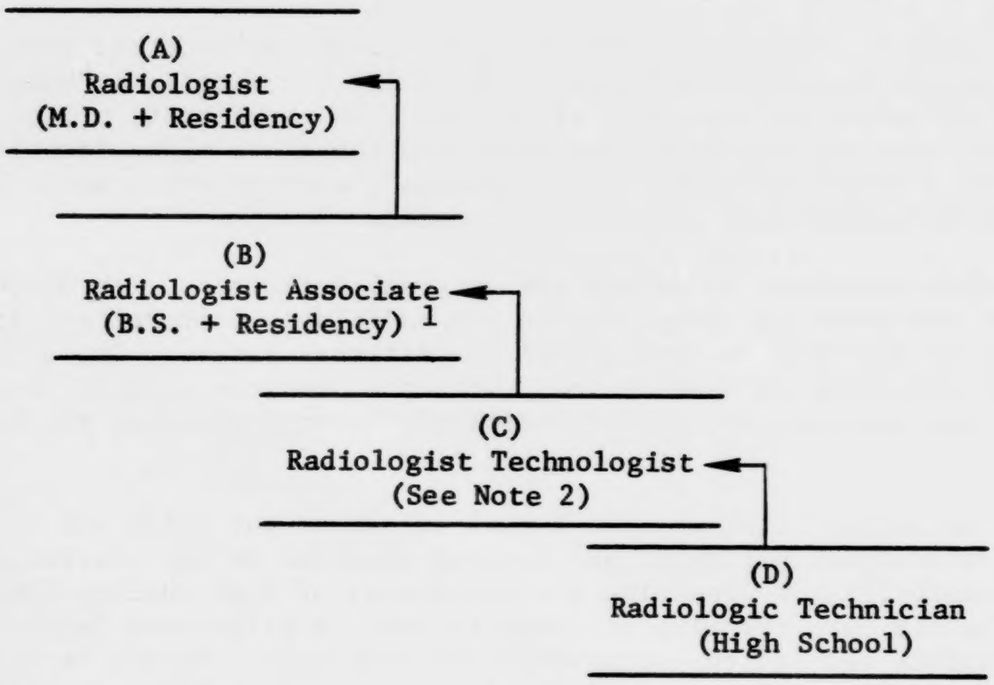
Strategy Three - Calls for a re-rationalization of our health care delivery system based on research on the practicality, effectiveness and the efficiency of alternative systems. Within this strategy we would have to explore throughly and systematically the role of the radiologic technologists, and other allied health personnel and the roles these people would assume within alternative systems of health care delivery.

For instance, delegation of patient care responsibilities to allied health personnel has reached a high order in "Kaiser-type" medical care delivery systems. As another example, the Albert Einstein School of Medicine has worked out an educational model which involved core-city, "disadvantaged," people who may be trained and educated in a continuum that ranges in level from health aides up to the physician, or other doctoral level preparation. Within this developing educational continuum it is theoretically possible to have a high degree of career mobility both vertically and horizontally. The third example is the often heard reference to a need to develop some kind of screening program to separate the "sick" from the "Well". I refer to an article by Dr. James Garfield in Scientific American in April, 1970. Lastly you may want to look at a model common in Russia which uses the Feldscher or less than M.D. level "doctor."

I suggest that Strategy Three is the most involved, most expensive and yet should be the most productive strategy if we are truly to deliver health care at the levels that the American public has a right to expect of us. On Friday, December 11, 1969, I was asked to further state how Strategy Three might be conceptualized and made operational. In essence, I stated we needed a study to rationalize or to re-rationalize the tasks, responsibilities and skills that are currently demanded or may be foreseeably demanded of radiologists, the radiologic technologist, the radiologic technician and closely supporting personnel such as the medical physicist and other kinds of rapidly developing technicians who work in the areas of nuclear medicine and the like. We need this study in order to develop a professional-vocational spectrum. I suggested that this spectrum would serve as a model for present and future development of actors in the system and would suggest the types and levels of training and/or education that will be needed to man the system. The attached diagram chart labeled "The Radiologic Education Spectrum" graphically shows the major current defined actors in the spectrum. This model could be further elaborated, particularly to identify the kinds and types of training and education that would be needed by the individual in order to acquire the knowledge and skills to perform at a given level.

THE RADIOLOGIC EDUCATION SPECTRUM

(A conceptual approach to rationalizing the types of actors, levels of training, education and experience. "A" represents highest level of skill/education and "D" lowest.)



Notes

1. Position not yet defined.
2. See "Essentials of an Accredited Educational Program for Radiologic Technologists, revised December, 1969," prepared by the Council on Medical Education of the American Medical Association.

"EXTERNAL INFLUENCES AFFECTING THE EDUCATION OF RADIOLOGIC TECHNOLOGISTS - A REACTION"

Reactor: Edmund J. McTernan
Dean
School of Allied Health Professions
State University of New York at Stoney Brook

The School of Allied Health Professions, of which I am Dean, does not have a program in Radiologic Technology. From one point of view, this would seem to raise the question that my very participation in this program is inappropriate; however, I would also like to state that the decision not to make an immediate move into radiologic technology was a conscious decision, not an accidental one, and that the decision was reached because of some of the problems with which this conference seeks to come to grips. In a sense, then, I constitute what lawyers might call an "hostile witness" - and any of you who watch the Perry Mason show know that this is often the guy that Perry builds his case upon.

The subject assigned to this workshop group is "External Influences." There seems to be a certain logic to examining the question, "External to what?". Before we throw ourselves into this assignment, all of us here today wear several different hats, and therefore might identify as members of a number of different "in groups", each of which would be concerned with different external influences.

In this workshop, do we see the external influences with which we should be concerned as those outside the radiologic fraternity? If so, the force of academia in each school are external forces. Or, do we see ourselves primarily as academicians, with the American College of Radiology and the American Society of Radiologic Technologists as the outsiders?

Let me suggest that we make a real effort to put aside all of our respective professional hats, and instead consider as our central concern the responsibility of promoting society's goal of high quality comprehensive health care for all, and seek to come to grips with forces that might militate against the achievement of that goal. In his keynote address to the annual meeting of the Association of Schools of Allied Health Professions, on November 22, 1970, Dr. Edmund D. Pellegrino stated, "The public mandate imposed upon all of us in the health professions is of the utmost clarity and explicitness. Society increasingly sees the health professions as a means to a specific goal: the promotion of health as a specific right of all citizens and as an indispensable element of the good life." I think that Dr. Pellegrino was saying, in effect, that society has finally decided that decisions about health services are too important to be left to the generals, i.e. the professionals. If our central focus is therefore the wishes of society, it proceeds naturally that our various professional identities may in fact be negative external forces which obstruct the goal of providing the best possible health care services - including radiologic services, to all citizens.

It is not necessary to point out in this group that health care has changed markedly, and continues to change at a remarkable rate. As the speaker before me said, the origins of these changes are not only in the expansion of scientific capacity, but also in a changing social and economic ethic. Not only do we have the potentials to provide better care to people, but the social order demands equal care for all - not just the privileged. Our medical care system, which was designed in the era of horse and buggy medicine, just cannot cope with the demands being placed upon it. Unfortunately, the concrete in which the present system was cast has proven unreceptive to reshaping efforts. One by one over the years, other kinds of health professionals have joined the friendly old family physician, and there are now over 125 people in that buggy. Each professional group has developed in a largely independent and unilateral way, each without concern for what the others have been doing. To pursue the horse and buggy analogy, each profession has decided where he will sit, how much of the seat he will occupy, and how and where the horse should go. Poor old Dobbin - symbolizing the society which supports our system - is bewildered by the need to respond to 125 hands on the rein, 125 whips goading him on. Maybe I have gotten overly involved in this analogy, but the point is that the conflicting goals of the many different professions, including those in the radiologic field, have served as strongly negative forces in the development of a rational and effective educational and service system.

If our poor horse is laboring under an oppresive load of self-serving professionalism, he is equally hampered by the heavy blinders of academic traditionalism. There is little doubt that the trend towards education of the health professions within the academic mainstream will continue, but this is not an unmixed blessing.

The value systems of American higher education have regrettably prized most highly some elusive thing that is called "pure scholarship", and fostered a very negative attitude towards what is called "vocationalism" - always pronounced with a sneer. Any educational effort which has a ultilitarian end is considered unclean. Academia, therefore, becomes another negative external force to obstruct our social goal. We seek sound education for professional excellence, and we seek potentials for upward mobility by the construction of legitimate and functional educational ladders. The goal is effective, efficient, satisfied workers in a system which permits "Each to Become All that

He is Capable of Becoming", whether he was born to a wealthy father or a poor one. Academia militates against this in its present form.

I have not, thus far, even mentioned directly the discussion areas originally suggested to me: licensure, accrediation, and certification, because I see those external influences merely as extensions of the two I have discussed - professionalism and academicianism. How do licensing acts and accrediation standards come into existance anyway? Ostensibly, they are promoted to protect the public from unqualified practitioners. Inevitably, they become instruments of economic protectionism, functioning largely in the interests of the in-group already certified. Once standards for the reasonable protection of the public are met, a spiral begins to constantly raise these criteria - always under the banner of righteousness, but always with the goal (possibly unrecognized) of keeping down the competition.

Now we are concerned with college affiliation for educational programs in radiologic technology. Does it seem reasonable to call for a baccalaureate degree for someone who must position a patient, set dials according to a preestablished chart, and push buttons? I think not. B.S. or even A.S. education for this function is a product of the external (to society) force of professional pride and protectionism. If, however, the external forces of the Radiology Guilds can be sold on the idea of creating a new level of radiologic technologists, with function that require cerebration and not just conditioned reflexes, then there is a legitimate role for colligate level education in this field. The pioneer efforts at the University of Kentucky, which I believe is still in the planning stage, would certainly justify higher education for the new breed of radiologic technologists, functioning at a truly professional level.

If you can break the hold exerted by external forces, which limit the functions of the radiologic technologists, the next step will be to break the stranlehold of irrelevancy in the academic arena. Some academicians, fortunately, are beginning to accept the fact that what you know is what is important - not how you learned it. Instruments for measuring an individual's knowledge and ability, such as the College Level Examination Program examinations of the College Entrance Examination Board, to cite one of several, are coming to the fore. This permits us to get away from insistence on examining only what a person has endured, not what he has learned or how he can use his knowledge. This will be crucially important in your field, because so many radiologic technologists have learned too much in non-colligate programs. Until now, we had to say, "Sorry, no credit, no recognition," but thank God, "times they are a changing" in this regard, too. Incidentally, we might pause a second to recognize that agencies such as the College Entrance Examination Board can be very positive external forces in our efforts towards the social goal.

Let me spend a few last moments on these two elements of professionalisms and academicianism in the specific terms of radiology. I stated at the outset that I was in one sense an "hostile witness" on this subject, because I have resisted a B.S. in Radiologic Technology program at Stony Brook. My resistance is not due to any feeling that there is not any B.S. level role for the technologists - to the contrary, I feel this is part of the wave of the future. Rather, my resistance is because I recognize the fact that we do the student an injustice if we don't run an approved program where an approval mechanism exists - and I feel that the radiologic technologist approval system is not only educationally indefensible, but morally wrong. Through blind insistence on a stated and large number of "required hours" rather than upon the far more logical system of stating behavioral goals, you create a class of indentured servant. In our present social system, I do not think this many hours - many of them non-essential, repetitive units of unreimbursed or inadequately reimbursed salary, is just. In this sense, the accreditation program in radiologic technology is, to my mind, a significant negative, external force. I would suggest that the single greatest positive results that might result from this Conference would be the serious consideration of conversion from hours to behavioral terms for approval of radiologic training programs.

If the medical profession, as one external force, can accept a truly professional role for radiologic technologists; if the American Society of Radiologic Technologists can define levels of function - including judgemental responsibilities - for a technologist at the professional level; if the interest lobbies can accept the fact that what counts is what a person knows, and not how he came to know it - then maybe we can hope that the external force of academia can break some of its sacred cows and participate in the design of a meaningful, respectable, and rational baccalaureate curriculum.

I submit to you that radiologic technology is way back in the pack in terms of logical social progress. Maybe this conference can move it to the forefront.

Reactor: George F. Koenig, R.T.
Department of Radiology
University of Kentucky

"External influences" affecting educational programs in radiologic technology, the topic assigned to me, cannot be discussed without touching also, more or less, on the other subject parts of the conference, that is manpower needs, administration, and especially curriculum.

Community colleges are especially suitable to produce the basic staff technologists. The closed-end, hospital-based program might continue to exist provided a total, formalized program with inherent capabilities of awarding acceptable credit towards future academic work equal to that provided by the community colleges is offered. Community college graduates would become the staff or basic working technologists. They will have the ready opportunity to progress to a higher academic situation (Baccalaureate degree) if they so wish. To repeat, I do not object to the hospital-based programs, good as some may be, provided they will introduce an academic formality similar or equal to the community college program, thus, allowing graduates credit in order that they may continue along a career ladder. "On-the-job-training" still in existance should be removed as completely unsuitable for the education of a radiologic technologist. Clinical experience (practicum) important as it is, must however become secondary to teaching such scientific data which is basic to radiologic technology. Twenty-four months must be the absolute minimum length of the total community college program. Emphasis should be placed on such academic subjects that will assure an open career ladder situation upon which other related careers may be built. Should there not be sufficient time left for practicum because of a preferred high didactic load, then an internship which is to begin after the minimum 24 months period is finished is to be recommended. The community college program should become the basis of a totally integrated program leading to the Baccalaureate, Masters, or even Doctorate degrees.

In the past, we had the radiologist, a physician with 13 years or more of schooling after high school. We also have the technologist with two years or less of training after high school resulting in a colossal void between the two groups. Radiology requires numerous groups of workers with varing education in addition to the radiologist. These must be developed in a suitable, formalized academic situation and not through individual self-education. Although we have produced a number of self-made upper echelon technologists, this is too slow a process. The Association of Schools of Allied Health Professions through some of their speakers at a recent meeting, advocated lateral as well as vertical career mobility. Thus, the future physician might arrive at the state through one or more steps in a career ladder prior to medical school such as nursing assistants, nurse, medical technologist, physio-therapist, or radiologic technologist.

In view of such developing changes, we cannot continue with outdated education concepts in our own specialty. We should, therefore, develop a total structure sufficiently formalized to allow career mobility from technologists to radiologists with numerous steps of positions in between. It is necessary then to examine the total radiology structure, every position, possible positions, and to list every task to be performed. Radiology may then be restructured in terms of work tasks with possible positions such as: technician aide (for duties such as film processing, patient transporter, etc.,) clerical positions including film sorter, transcriptionist, receptionist, and so forth, staff technologist (graduates from junior colleges), supervisors and chief technologists (additional education might be required, possibly establishing an academic category somewhere in between Associate and Baccalaureate degrees). Teachers, directors of schools, inservice educators, research technologists, equipment coordinators, radiation physics technologists, radiation health technologists, administrative assistants and coordinators should become qualified through Baccalaureate degree programs. Radiation physics basic to radiotherapy technology and nuclear medicine technology should be included during that phase.

After attainment of the Baccalaureate degree, graduate programs then should become available which will lead the students in the direction of becoming radiation physicists, radiation health physicists, researchers, educators, and others as listed under the Baccalaureate degree programs. The graduates would be awarded a Master's degree or, in continuation, a Doctorate. The radiologist assistant or associate or advanced technologist, whatever the title may be, may readily fit in somewhere along this career ladder scheme as described. Entry into medical school and later on into radiology may also become possible. This scheme would allow considerable vertical career mobility and permit the ambitious to reach any desired goal. Others may stop at any rung suitable to their needs and capabilities. Provisions for lateral career mobility must also be made in order to avoid Radiologic technology from becoming an insular situation. Lateral career mobility will relate to core programs as well as to the development of urgently needed common teaching facilities.

A study of "practicum" should be undertaken. Questions such as: how many examinations are to be done, how many hours are necessary, what type of examinations are to be conducted, and what type of hospital is suitable, need to be asked and answered.

A heavy use of laboratories providing X-ray equipment and phantom material will aid considerably in shortening the length of clinical experience.

Accreditation of the programs might be left in the hands of the presently existing joint accreditation committee sponsored by the American College of Radiology and the American Society of Radiologic Technologists. However, I would recommend the addition of educators from the junior college programs to this committee. Accreditation and certification is presently under study of Dr. William K. Selden's committee, Commission for Study of Accreditation and Licensure in Selected Health Professions, for the Association of Schools of Allied Health Professions.

The A.M.A. may be asked to continue offering their facilities and name for accreditation purposes unless there is reason to believe that another national educational body may serve this function better. It, is of course, advisable to await Dr. Selden's report. Certification of the students may well continue to be conducted by the A.R.R.T. Some important changes are indeed necessary. The examinations for certification must relate to the educational needs of the profession. Such tests should then relate specifically to the teaching in the community colleges and the quality of such teachings. The Registry then must relate to community colleges, the professions concerned, and to the societies representing these professions, namely, the ACR and the ASRT. Especially, must the ASRT be represented because it is logical to assume that the technologists standards will match or surpass those that might be set by radiologists.

Additionally, it is important to involve professional educators from the community colleges with representatives to sit on the boards of these organizations. It seems rather necessary that the ASRT becomes a greater force in the affairs of technologists, to govern standards affecting all schools of technology and especially to affect the resulting quality of students graduating from such institutions. For this reason, a registry board composed of four radiologic technologists, two radiologists, and two professional educators possibly selected from the Americal Association of Junior Colleges might be recommended instead of the presently existing composition.

There is little doubt that the state licensure will come about in each state soon. For each state to write and conduct its own examination certainly would be impractical and would prevent ready personnel mobility from state to state. A national registry board acceptable to each state should be available to them. A national registry board with a trustee composition as explained earlier would be more suitable and acceptable to the states. Licensing of radiologic technologists in the individual states must come about in order to protect the public from unnecessary radiations. It is, indeed, mandatory that all radiologic technologist practitioners should come in the future from schools where radiation safety is taught to the degree that patients will in all instances receive minimum radiation exposure consistent with good quality examinations. Certainly, the present bill before the Senate, S-3973, sponsored by Mr. Randolph, Mr. Eagleton, Mr. Gravel, Mr. Hart, Mr. Javits, Mr. Mondale, Mr. Moss, Mr. Muskie, Mr. Stevens, and Mr. Williams, entitled "Radiation Health and Safety Act of 1970" might adequately serve that purpose.

Professional societies must assume responsibility for the establishment of the necessary educational milieu for their profession. The ASRT has done much, especially in recent years, to upgrade all technology schools. Although it has the support of a good portion of all technologists, the number of members is not sufficient to support new expensive programs. The ASRT is facing a dilemma because many of the non-members who came through the "on-the-job-training" process have no real appreciation for the future educational needs of the professional and hence exhibit an indifference.

The hope for the Society to find the proper support then lies in the younger present graduates from better educational systems. Thus, as the better educated technologist graduates and exerts his influences on the Society, the Society in turn will develop better educational programs.

The ACR and ASRT, the organizations traditionally concerned with the education of technologists, have jointly established the certifying body, the ARRT, and more recently the Joint School Accreditation Committee.

I wish to propose the addition of a joint committee on educational systems. Both the ACR and ASRT are equally involved in total manpower requirements of radiology, be it the technical aides, technologists graduated from junior colleges, instructors, or the advanced technologists. Both organizations are equally deeply involved in education as it relates to all levels of technology. This even includes resident training in so far that technologists play a vital role as instructors in technique and management principles. Existence of a joint committee on educational systems would eliminate for the ACR, if it so wishes, a possibly unwieldy Committee on technical affairs. It would also if it so wishes, eliminate for the ASRT an often unproductive Education Committee.

Suggestion -

Composition of Joint Committee on Education Systems.

6 ACR radiologists
6 ASRT technologists or any other equal number
1 radiation physicist, American Association of Physicists in Medicine
2 educators from community colleges, members of Association of Junior Colleges or Association of Schools of Allied Health Professions Council on Community Colleges

1 educator from A.S.A.H.P. Council on Baccalaureate Degree Programs
1 federal government official as a member or consultant.

Variations other than the above might be developed to possibly include an osteopathic radiologist, a member of A.U.R. and A.U.R.T. and others. Consumer representatives might also be included.

Utilization of the office of educational Director as already in existence within the home office as a part of the ASRT structure, might suitably become the operational base. The director would be charged with manifold duties such as development of educational materials, distribution of information, providing of advisory consultations, development of statistics, and conducting research into suitable teaching methodology. Such a scheme would be financed by the endorsing organizations and hopefully through grants.

EXTERNAL INFLUENCES ON THE DEVELOPMENT OF COLLEGE PROGRAMS IN RADIOLOGIC TECHNOLOGY

Special Resource Speaker: Howard Goldman, L.X.T.
Director, Bureau of X-ray Technology
New York State Health Department

If college programs for educating radiologic technologists are to become a going concern--and they must if there is to be any hope of training new radiologic technologists in the numbers required to meet growing future needs--it is absolutely necessary that these college programs be allowed to develop free of unrealistic or prejudicial constraints which can, and in fact do, impede their development. It cannot be repeated often enough that in the interplay between the colleges and the professional community, it is the professional community of both radiologists and radiologic technologists which needs the colleges far more than the colleges need programs in radiologic technology. Colleges today are besieged by many groups in the health and other fields to begin training programs, and the demand generally exceeds the colleges' resources to begin new programs. Under these circumstances, the administrations of the colleges will not knuckle under to the imposition on them of unacceptable--and perhaps even what they would consider unethical--conditions for accreditation.

Five years ago, in 1965, the first college program for radiologic technology was established in New York state. At that time, we had envisaged the establishment by 1970 of a network of from 15 to 20 college programs located throughout the state. Today, however, there are only ten programs in actual operation in New York state, with a number of others still in the "planning stages" which we had hoped would have begun a year or two ago. Therefore, while the plan to promote college training in New York state is far from a failure, it has not been as successful as we had hoped insofar as the pace of its development is concerned.

To a great extent, this slowing down of progress is related to a lack of understanding and acceptance by many radiologists and radiologic technologists of the essential standards for sound college programs which guide the academic community and which, in New York state, form the basis upon which the state education department grants approval to commence new college programs.

This "hamstringing" effect operates in a number of ways. In some cases, influential radiologists and technologists in a community may completely refuse to cooperate with a prospective college program, or else--which amounts to the same thing--be willing to cooperate only under unacceptable conditions which give control of the program to their hospital radiology departments. Without this access to the clinical facilities of hospitals in the community, a college program can never get off the ground. With the college facing only troubles in starting the radiologic technology program, and with more attractive possibilities for programs in other fields where they are being encouraged rather than impeded, why should the college bother?

But even if the cooperation of radiologists and technologists on the local level is initially forthcoming, the college still has to face the problem of trying to obtain the approval of the medical profession in the form of accreditation by the Council on Medical Education of the A.M.A. Although this accreditation is in a sense "voluntary", there are, nevertheless, compelling reasons why this agency, operating through the American College of Radiology, can damage the prospects for a college program by failure to approve it just as effectively as any education agency, either voluntary or governmental, can do. The double-edged sword which the Council on Medical Education holds over the heads of colleges which do not conform to its standards are: (1) Withholding eligibility for A.R.R.T. certification from its graduates, and more important, (2) bringing about a situation whereby lack of A.M.A. approval induces radiologists and chief technologists to withdraw the college's access to the clinical facilities of the hospital radiology departments.

Now A.M.A. approval would not present a problem to colleges if the standards of the A.M.A. for approval of college programs were not in some essentials, unreasonable, and if the granting of this approval were not at best done grudgingly.

The plain fact is past experience in New York state indicates the Council on Medical Education of the A.M.A. has not been enamored of the idea of college programs for radiologic technologists and has only recently given them any recognition at all. Why they took this position toward college programs should be apparent to anyone familiar with the underlying currents in the relationships between the medical profession and the allied health professions, and specifically between radiology and radiologic technology. To put it very succinctly into one word, what is basically involved is control.

It would be unrealistic to ignore the fact that in this relationship between radiologists and radiologic technologists, there is a built-in conflict which is manifested not only in terms of bread-and-butter issues, but also in terms of the professional status (or lack of professional status) of radiologic technologists. The basic question at stake is whether or not radiologic technology is really a profession. An essential characteristic of a profession is that it is self-governing. If radiologic technology is a true profession, then standards for education, admission, ethical conduct, and so forth, must be established by the profession itself. In short, there must be peer control. But we know only too well that in matters affecting the professional practice of radiologic technology, the dominant voice listened to is not the voice of organized radiologic technology. The American tradition of professional self-regulation free from undue outside interference is not a benefit extended evenly to all professions.

I have gone into this apparent diversion from my main topic because I firmly believe that no one can appreciate the real meaning of college training for radiologic technologists unless he also sees its significance in terms of the efforts of radiologic technologists to establish the independence and status of their profession; in fact, to establish that they really are a profession at all, which has a body of knowledge and skills which they possess to a higher degree than any other group.

Let us return to the specific problem of obtaining A.M.A. accreditation of college programs. The formal standards for this accreditation are embodied in "Guidelines"developed by the A.C.R.'s Commission on Technologist Affairs, dated December 1, 1968. The essential features of these "Guidelines" which make them unacceptable to colleges, educators, and state education departments (at least in New York state) are:

1. "The organization and operation of the school must be the joint responsibility of the college and of the radiology department or departments of the cooperating hospital or hospitals." Educators with high professional standards will not accept such an arrangement as workable. Based upon their experience with other programs in the past, they have found that the responsibility for any program of study must rest with one facility, and it should be the one which is educationally oriented and which grants the degree.

2. "A qualified radiologist shall be responsible for the organization and conduct of the school." Even assuming the validity of this requirement, to do this properly and honestly would require the employment of full-time radiologists on the staffs of the colleges to supervise the administration of the radiologic technology curriculum. This is manifestly unfeasible since a college could not pay a radiologist what he is used to getting. Although it is true that a part-time radiologist could act as a "figurehead" director, while the course is actually run in all of its details by a radiologic technologist, it would be difficult, if not impossible, to obtain the cooperation of many college officials in maintaining such a "fiction."

3. "Selection of students for the school shall be the joint responsibility of the college and hospital or hospitals." As in the matter of school organization and operation, colleges insist that student selection must be the responsibility of the college and, except in an advisory

capacity, cannot be given over to participating hospitals.

4. "At least 2400 hours of hospital based practicum shall be provided. Time used in work on phantoms and other inanimate objects shall not be given credit toward the 2400 hours of the practium." Here there are a number of objections. First, it establishes a rigid criterion in terms of a number of hours which has absolutely no basis in either logic or studies and which, in fact, is no longer applied even to hospital schools where the published "essentials" speak only of "adequate hospital experience." Second, it assigns no value to the highly structured laboratory-on-campus experience which is an essential and unique feature of college programs. Third, it treats practical experience in purely quantitative terms, and takes no cognizance of the highly-structured nature of the hospital experience received by college students who are under the close supervision of educationally-oriented college instructors. And fourth, it places the colleges in an untenable situation whereby they must accept one of two highly undesirable alternatives which violate the basic principles of the community college: either extending the course of study beyond two years or cramming the course of study into two overcrowded years.

In summary, the unrealistic requirements for A.M.A. approval of College programs today constitutes the greatest single impediment to their rapid development. The A.M.A. and the A.C.R. are mainly oriented toward the hospital--rather than the college--as the basic institution for training radiologic technologists. Therefore, in the past in establishing standards for colleges, they have used the standards for hospital schools as their springboard and they have tried to fit a square peg into a round hole. In addition, they have used as a standard for comparison not the hospital school as it really exists with its many weaknesses and deficiencies, but they have glorified the ideal of the hospital school as it too often only exists on paper, and then they have gone on to enforce these paper standards on colleges with a conscientiousness and severity which has not been applied in the same degree to the hospital schools. Where colleges have been unable or unwilling to change their programs to meet unreasonable standards, those enforcing the standards have sometimes asked the colleges to engage in evasive "fictions" so that the standards will appear to be met. But even then, when the colleges have extended themselves to the limit to satisfy A.M.A. requirements, the colleges have still found themselves the victims of endless delay and bureaucratic red-tape. If any governmental agency, such as a state Health Department, or a State Education Department, were to treat a school applying to it for approval in the abritrary and protracted fashion in which colleges have been treated by the A.M.A.'s council on medical education, letters of complaint would soon be forthcoming to the governor, to legislators, and so forth.

No doubt, some people here will feel that I have presented a totally onesided picture. I have said nothing about the bureaucratic red-tape which governmental agencies place in the way of college programs for radiologic technology. In fact, I know of a few colleges in New York State which may believe that the state education department has given them a hard time in obtaining approval of their plans for new programs. One requirement in the law which colleges have objected to is the rigid provision for 2400 hours (hospital and lab experience). As a result we have proposed an amendment which will remove this unreasonable barrier. Generally, where we have "butted heads" with colleges has been in our resistance to approval of "bargain basement" or "instant" programs. Where a college wishes to commence a program, we have insisted that they go into it with both feet and establish their own faculty, curriculum and college laboratory facilities, rather than attempt to superimpose a college affiliation over an existing hospital course.

In New York State, you will find no schools in which students first enroll in a college for a number of semesters of classroom work, which is then followed by an additional period of time for clinical experience such as an internship in a hospital radiology department which, for the most part, is completely divorced from college supervision. Neither will you find programs in New York State in which a hospital or a group of hospitals send their students to a central college for their didactic instruction only, and then the hospitals in all other respects operate independent schools. In New York State, the state education department does not look favorably upon either of these arrangements as educationally sound, since they do not provide for an adequately structured program in which the didactic and laboratory instruction is integrated with the clinical experience, and the clinical experience itself is carefully planned.

What is being done is to develop completely integrated two-year programs at colleges which are adequately staffed and furnished with adequate physical facilities for high-quality instruction in both the technical and liberal arts subjects, and whose staffs, in cooperation with the staffs of affiliated hospitals, plan and implement a careful program of structured clinical experience at both the hospital and the college laboratory.

Parenthetically, in New York State it is the hospitals which are affiliated with the colleges, and not vice versa. This makes a world of difference. For one thing, it means that the college faculty goes into the hospital radiology department with the students and/or works closely with both the radiological and technological staffs of the radiology department, rather than taking a "hear-no-evil," "see-no-evil" approach to the clinical experience of the students.

One final way in which the New York State Education Department has limited, through regulations, the options of a college is by its refusal to approve plans based on the concepts of either extending the program beyond two years or else graduating students who still have something less than full professional qualifications and must then complete an additional "internship." It is essential that college programs produce graduates who are completely competitive with both graduates of hospital schools and with graduates of other, comparable two-year college programs. We should not accept the concept of turning out a graduate who must begin his career as a "second-class citizen" in his profession.

I hope that this conference will result in guidelines which are sound and tailored to the specific needs of the college situation, as well as to the needs of the profession of radiologic technology for well-trained beginning radiologic technologists and also be accepted by the A.S.R.T., A.C.R. and A.M.A.

EXTERNAL INFLUENCES WORKSHOP REPORT

This workshop focused on those external influences that have a direct and/or indirect bearing on the administration, curriculum and manpower needs of college affiliated educational programs in radiologic technology.

Our group has been charged with the responsibility of delving into those tangible and intangible factors which affect and/or influence these programs. Factors that were considered included accreditation of programs, certification of students, existing State laws and government regulations, funding mechanisms, professional organizational essentials and socio-economic influencing factors.

For procedural purposes the group considered 3 major kinds of influences:

Governmental Policies and Regulations

Accreditation, Certification and Licensure

Socio-economic Factors.

Governmental Policies and Regulations

Community colleges, to begin a program in radiologic technology, must investigate State and Federal policies as they apply. Eligibility for funding from these sources will depend upon both institutional accreditation and legal authority. Consideration should be given to the availability of financial assistance for both the institution and its students. Student assistance may be available in the form of scholarships, loans and work-study programs. Institutional support might be sought for planning, construction, equipment, books, research and student grants. Possible sources of support include the Bureau of Health Education and Manpower Training, DHEW; the Office of Education, DHEW; the Office of Economic Opportunity; and State Departments of Education and Health. The possibility of individual and corporate funding or gifts of equipment should not be overlooked; these may provide a tax advantage to the donor.

Proposals for enactment of Federal minimum standards for radiologic technologists have been introduced in Congress. Should these be approved, they will have a significant impact on curricula. (in developing the radiologic portion of the curriculum, it should be noted that a standard syllabus for the teaching of radiologic technology is presently available from the American Society of Radiologic Technologists.)

Licensure or certification laws are currently in effect in California, New Jersey, New York and Puerto Rico. Where these exist, appropriate agencies such as departments of health or environmental protection should be contacted in addition to the departments of education. Model legislation now exists to facilitate uniform licensure in other states. This reflects government policy that persons who use ionizing radiation on humans be required to show proficiency in its use. (See Model Legislation for Users of Ionizing Radiation for the Healing Arts, BRH/ORO 70-8, October 1970, U.S. DHEW).

In some States, teaching credentials will be required of technologists and others who will serve as teachers in the program, and the State Board of Education should be contacted to assure compliance.

To maximize the geographic mobility of its graduates, the college program should be designed to be acceptable in as many other States as possible. Approval by the Council on Medical Education of the American Medical Association will generally assure compatibility. Consideration should be given to reciprocity between the ARRT and State licensing agencies.

Another external influence may be impending national legislation for financing health and welfare and reorganizing the delivery of health care services.

Accreditation, Certification and Licensure

We have formulated some guidelines for college affiliated educational programs in radiologic technology concerning licensure, certification and registration of the individual, and accreditation of programs.

I. Non-Governmental Procedures

Educational programs are accredited under the auspices of the Council on Medical Education of the American Medical Association. Individual technologists are certified by the American Registry of Radiologic Technologists and by the American Radiography Technologists.

A. Accreditation of Program

The sponsoring institution (college) can obtain application forms from the Department of Allied Medical Professions & Services of the AMA, 535 Dearborn Street, Chicago, Illinois 60610. (See diagram of internal procedural mechanism for program approval, on page 239 of this report).

Provisional approval of beginning programs may be granted on the basis of documentation of acceptable program strength. Site visit evaluations are conducted periodically by a technologist-radiologist team appointed by the Joint Review Committee on Education in Radiologic Technology. Based on submitted documents, the report of the survey team, and subsequent consideration by the Joint Review Committee, the Council on Medical Education may grant full or probationary approval or may withhold or withdraw approval. An appeals mechanism is provided.

B. Technologist Certification

A student radiologic technologist, in order to become certified by the American Registry of Radiologic Technologists, writes to its office at 2600 Wayzata Blvd., Minneapolis, Minnesota 54405. Certification by the ARRT, though voluntary, is extremely important. It provides the technologist mobility. Certification by the ARRT is recognized throughout the United States and most of the free world. For information regarding certification by the American Radiography Technologists, write to P.O. Box 284, Enid, Oklahoma 73701.

II. Governmental Procedures

At present, it is necessary for programs of radiologic technology to receive state approval/accreditation in the following four States: New York, New Jersey, California, and Commonwealth of Puerto Rico. In some of these States, both the State Education Department and State Health Department should be contacted.

To facilitate licensure, certification, registration and accreditation, the committee proposes the following recommendations:

The above procedures should be followed until recommendation below can be effected.

A moratorium on new accrediting mechanisms should be effected immediately to extend until the recommendations of the Study of Accreditation of Selected Health Educational Programs sponsored by the Council on Medical Education of AMA, the Association of Schools of Allied Health Professions and the National Commission on Accrediting are available for consideration (possibly by August 1972).

In the interim, the committee recommends the formation of a forum to be coordinated by the Association of Schools of Allied Health Professions to consider the immediate problems connected with accreditation, approval, certification and licensure. The forum should include representatives from:

Association of Schools of Allied Health Professions
American Medical Association's Council on Medical Education
American Association of Junior Colleges,
National Commission on Accrediting,
American Society of Radiologic Technologists,
American Radiography Technologists,
Association of University Radiologic Technologists,
National Association of Boards of Radiologic Technology,
American College of Radiology,
American Association of Physicists in Medicine,
United States Office of Education,
U.S. Public Health Service.

Socio-Economic Factors

I. Employment of Associate Degree Graduates, and economic justification of the program for third party payers and others...

A. To facilitate employment opportunities and adequate compensation for associate degree radiologic technologists, we recommend that efforts be made to substantiate the following general premises through whatever documentation is deemed necessary.

1. Associate degree programs are more efficient - more people can be as well or better educated in the community college framework.

2. College programs place educational funding on the tax and/or educational base, removing the burden of education as an added drain upon the hospital patient.

3. Because of broader education in basic sciences and the liberal arts, associate degree graduates, while technically equals, are also well-prepared to deal with the human and administrative problems in the work situation. This should, hopefully, result in more efficient departmental operations.

4. Associate degree graduates will have greater insight into the elements of good teaching as a result of exposure to it in the community college.

5. Through generally better understanding of the theory and uses of ionizing radiation, the associate degree graduate will have greater understanding of the "Whys" as well as the "Hows," and relate better to the dual objectives of good patient care and safety.

a. This knowledge should also stimulate the associate degree graduate's program of continuing education in response to technologic change and make him a better candidate for professional advancement in administration, education and/or the advanced specialties.

B. When such substantiation is available, the field as a whole should seek ways to promulgate these facts to the health services industry in the broadest sense and to potential students and student influences. Some methods, in addition to the obvious multi-media information effort, might include:

1. A strategy of placing associate degree graduates in high visibility situations in terms of the employers, and then doing evaluative studies of job performance.

2. A special effort should be made to point out the advantages of both associate degree and certificate programs as an aid to student choice in terms of the positive advantage of each choice.

3. Salary guidelines should be produced...after reasons for differentials have been established. Adequate compensation is the key to attracting the type of students, including males, who will become life-long professionals.

II. Maximizing Human Potential for the Associate Degree Programs

A. Equivalency. We suggest adequate equivalency exams be developed in response to industry pressure to give registry and consequent promotional opportunity to qualified persons now working in the field, such as graduates of commercial schools, or products of preceptorial programs, formal or informal, as well as potential candidates from other backgrounds, such as the military. These examinations should adequately measure performance. Such exams should be able to establish total or partial qualification for registry (or for certificate graduates, credit toward an associate degree), and should serve as effective guides for placement with advanced standing in completion programs. Completion programs should be developed wherever necessary.

B. Financially Disadvantaged Persons. Efforts should be made to provide the opportunity for each qualified student to attend an associate degree program regardless of individual financial resources. This could include such conventional aids as scholarships, grants and guaranteed loans (with forgiveness provisions for work in technician-short areas), plus work-study programs, and stipends from co-operating clinical facilities which are commensurate with the value of the work performed.

C. Educationally Disadvantaged Persons. Consistent with the "open door" policy is a curriculum which is flexible enough to allow the able but educationally disadvantaged student to proceed at his own pace (within reason), with provisions for adequate compensatory educational support. It has been observed that student motivation is generally higher in programs where the student follows this format, rather than having to "get qualified" in a special preliminary program.

D. For both the educationally disadvantaged and other high school students, we suggest that careful attention be paid to aide-level programs now under development in high schools in certain areas, programs which articulate (with credit) with community college associate degree programs.

E. Flexibility. Define essentials so that they truly are - allowing educational institutions to respond to their own ideas for innovation and the particular needs of the major employers of their graduates. e.g. New technology is not adopted simultaneously but generally filters out from the educational centers for medicine. Therefore associate degree programs associated with or producing technologists for such centers may need significant variations from the educational norms. For this, and for other reasons, radiologic technology accrediting and evaluating bodies should be prepared to exercise a measure of flexibility in approvals, determination of essentials, etc., at least during the present transition period - provided appropriate measuring devices are built into the variations to provide for evaluation of the resulting product.

An example of such flexibility would be the following recommendation:

> Inasmuch as present length of radiologic technology patient contact time may not conform to the needs of existing and proposed associate degree programs, it is recommended that a study be conducted to develop a mechanism which can accurately evaluate the competency of students in degree and certificate programs in designated associate degree institutions, regionally accredited.

Other disciplines often grant pilot or experimental waivers for innovative programs, and such procedures might be considered by radiologic technology evaluating and accrediting bodies in this and other situations.

III. Miscellaneous Recommendation

A. Curriculum and Financial Rewards. Since we apply similar curricula (core curricula) in the associate degree health fields, then systems of seeking reasonably equitable financial rewards for similar training should be explored with other disciplines.

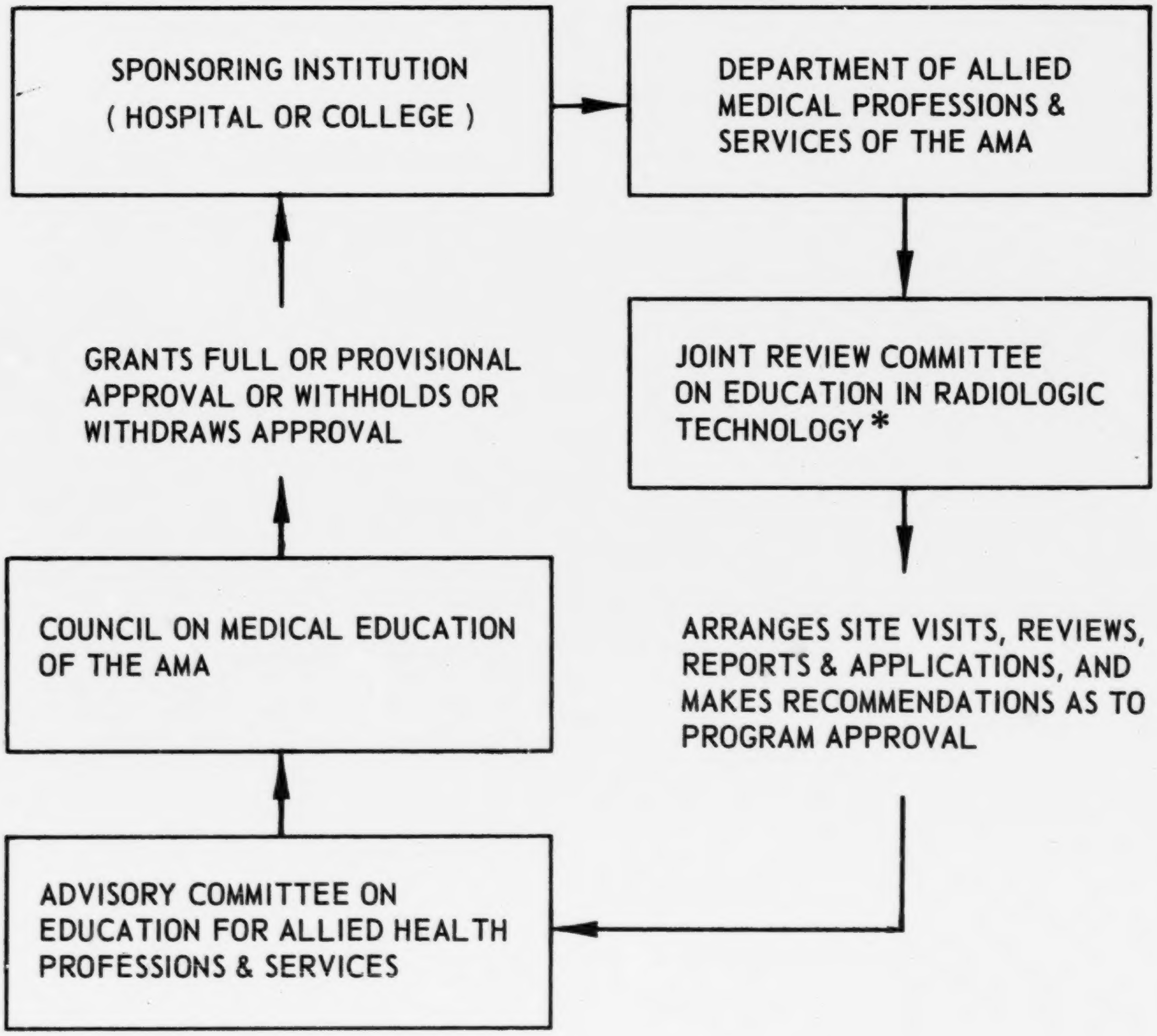
IV. Social Relevancy for Associate Degree Programs

A. Responding to the question of community pressures growing from the social ferment of our era, we would suggest that radiologic technology programs specifically, and the community college health programs generally, use a number of mechanisms now available for maintaining social relevancy. Among these would be:

1. Representatives of the program and/or the college serving on local and area health planning bodies - which, in most circumstances require at least 51% consumer or public representation on their governing boards

2. Insisting upon consumer and perhaps student representation on health program and general college advisory boards, with due attention paid to groups such as the disadvantaged, patients, labor, farm groups, minorities, etc., depending upon the makeup and needs of the community.

Internal Procedural Mechanism for Program Approval


SPONSORING INSTITUTION
(HOSPITAL OR COLLEGE)
DEPARTMENT OF ALLIED MEDICAL PROFESSIONS & SERVICES OF THE AMA
JOINT REVIEW COMMITTEE ON EDUCATION IN RADIOLOGIC TECHNOLOGY *
ARRANGES SITE VISITS, REVIEWS, REPORTS & APPLICATIONS, AND MAKES RECOMMENDATIONS AS TO PROGRAM APPROVAL
ADVISORY COMMITTEE ON EDUCATION FOR ALLIED HEALTH PROFESSIONS & SERVICES
COUNCIL ON MEDICAL EDUCATION OF THE AMA
GRANTS FULL OR PROVISIONAL APPROVAL OR WITHHOLDS OR WITHDRAWS APPROVAL

*Made up of individuals appointed by the American Society of Radiologic Technologists and the American College of Radiology.

APPENDIX I

CONFERENCE REFERENCES AND RECOMMENDED PUBLICATIONS

1. Essentials of an Accredited Educational Program for Radiologic Technologists - Revised December 1969, Prepared by the Council on Medical Education of the American Medical Association.

2. Organizational Guide for Associate Degree Programs in Radiologic Technology - Prepared by the American Society of Radiologic Technologists.

3. Guide Lines for Junior College Affiliated Educational Programs in Radiologic Technology - Prepared by the American College of Radiology, Committee on Technologist Training.

4. Job Descriptions for Radiologic Technologists and Glossary of Terms - Prepared by the American College of Radiology, Committee on Technologist Training.

5. Curriculum and Teacher's Syllabus for Schools of Radiologic Technology - Published by the American Society of Radiologic Technologists, Interim Printing, 1970, Price $3.50.

6. List of Approved Schools of Radiologic Technology (Accredited by the Council on Medical Education of the American Medical Association) - Revised in Fall of 1969.

Above publications available from:

The Executive Director
The American Society of Radiologic Technologists
645 N. Michigan Avenue
Chicago, Illinois 60611

7. A Guide for Health Technology Program Planning - 1967, Prepared by the National Health Council and the American Association of Junior Colleges under grant from the Office of Education, U.S. Department of Health, Education, and Welfare, $1.00.

8. General Education in Occupational Education Programs Offered by Junior Colleges - by Robert Wiegman, 1969, American Association of Junior Colleges, $1.50.

9. A Primer for Planners - 1967, Articles on Planning New Facilities reprinted from the Junior College Journal, 1967, American Association of Junior Colleges, $1.50.

10. *Education for Health Technicians - An Overview*, Robert E. Kinsinger, A Report to the American Association of Junior Colleges, Second Edition, February 1966, $1.00.

11. *Extending Campus Resources* - Guide to Using and Selecting Clinical Facilities for Health Technology Programs, 1968, American Association of Junior Colleges, $ .75.

Above publications available from:

The American Association of Junior Colleges
1315 Sixteenth Street, N.W.
Washington, D.C. 20036

12. *Recommended Curriculum Standards for Schools of X-ray Technology*, State of New Jersey - Department of Health, Bureau of Examination and Licensing, P. O. Box 1540, Trenton, New Jersey 08625.

13. *The Development of an Educational Plan for Granting an Associate of Arts Degree in Radiologic Technology*, July 1968. By R. C. Palmer and R. W. Carter, Radiology Department, School of Medicine, Emory University, Atlanta, Georgia 30322.

14. *National Conference on X-ray Technician Training* - September 7-9, 1966, Bureau of Radiological Health, Public Health Service, DHEW (out of publication).

15. *Report of the Medical X-ray Advisory Committee on Public Health Considerations in Medical Diagnostic Radiology (X-rays)* - October 1967, National Center for Radiological Health, Bureau of Disease Prevention and Environmental Control, PHS, DHEW (for sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 - Price $ .35).

16. Reports of the National Advisory Council on Vocational Education, Vocational Education Amendments of 1968, Public Law 90-576
    A) Annual Report, July 15, 1969
    B) Second Report, November 15, 1969
    C) Third Report, July 10, 1970
    Published by the Office of Education, U.S. Department of Health, Education, and Welfare, Room 5018, R.O.B.-3, 7th & D, S.W., Washington, D.C. 20202.

17. *Comparative Analysis of Cooperative Education Programs and Work-Study Program*, March 1970, Division of Vocational Technical Education, Bureau of Adult Vocational Technical Education, U.S. Office of Education, Washington, D.C. 20202.

18. *Health Occupations Education 1969*, Annual Report on Vocational Training Education's Program, Division of Vocational Technical Education, Bureau of Adult Vocational Technical Education, U.S. Office of Education, Washington, D.C. 20202.

19. *Directory - State Officials Responsible for Supervision of Health Occupations Education*, September 1970, Division of Vocational Technical Education, Bureau of Adult Vocational Technical Education, U.S. Office of Education, Washington, D.C. 20202.

20. *Health Manpower Source Book 21, Allied Health Manpower Supply and Requirements: 1950-80*, by Maryland Y. Pennell and David B. Hoover, Division of Allied Health Manpower, Bureau of Health Professions, Education and Manpower Training, NIH, PHS, DHEW, PHS Publication #263, Section 21. (For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $1.25).

21. *Model Legislation for Users of Ionizing Radiation in the Healing Arts*, BRH/ORO Publication 70-8, October 1970, (N.T.I.S.) $3.00.

22. *Health Training Improvement Act of 1970, Public Law 91-519*, 91st Congress, S.3586, November 2, 1970 (Provides for funds for education and training in the allied health professions).

23. *Public Health Law, State of New York, Article 35 - Practice of X-ray Technology*, effective July 1, 1964 (Regulation and Certification of Radiologic Technologists) State of New York, Department of Health, 84 Holland Avenue, Albany, New York 12206.

24. *State of New York, Administrative Rules and Regulations*, Chapter II, Subchapter L - X-ray Technology and Chiropractic Use of X-ray, State of New York, Department of Health, 84 Holland Avenue, Albany, New York 12206.

25. *State of New Jersey, Chapter 291* - Laws of 1968 (Certification of Radiologic Technologists) New Jersey Department of Health, P.O. Box 1540, Trenton, New Jersey 08625.

APPENDIX II

CONFERENCE GLOSSARY

The Conference glossary was sent to each participant before the Conference began for the limited purpose of identifying and defining key terms associated with the Conference subject. The Bureau of Radiological Health wishes to acknowledge those who assisted unselfishly in producing the glossary and in particular: Robert Coyle, Richard Olden and Warren Ball.

The Conference subject - "College Affiliated Educational Programs in Radiologic Technology" - was neither defined nor synonyms identified. Persons associated with the field of radiologic technology understand and accept this terminology. Basically it means that the program for educating student radiologic technologists rests with the recognized academic institution which in turn relies on care oriented radiology departments in hospitals to provide students with practical and clinical experience. The educational institutions include junior colleges, community colleges, and four-year colleges and universities, but the program of academic instruction does not exceed two years in duration. Radiology departments that provide the practicum are normally located in accredited hospitals where a verbal or written agreement has been reached with the sponsoring institution.

Synonyms for the college affiliated educational programs in radiologic technology include:

1. College affiliated radiologic technology programs
2. Associate arts degree programs in radiologic technology
3. Associate science degree programs in radiologic technology
4. Two-year college programs in radiologic technology
5. Community college radiologic technology programs
6. Junior college radiologic technology programs

GLOSSARY OF TERMS

Accreditation	- The process by which an educational program is officially recognized as meeting or exceeding all formal requirements of academic qualities, curriculum and facilities. These activities are carried out by an agency authorized by the National Commission on Accrediting to evaluate compliance with established standards of education.
Career Ladder	- An established progression of job opportunities from a basic, or entry, level to levels requiring additional education or experience, or both.
Certification	- The act of attesting to, or confirming the ability of an individual or group to perform specific kinds of tasks in an acceptable manner.
Community College	- An educational institution offering programs for career entry, career improvement or courses typically offered in the first and second years of baccalaureate programs. (So called because of a philosophical, if not always practical, identification with the community in which such an institution is located).
Curriculum	- A program of instruction designed to attain a determined objective.
Demography	- The statistical study of human populations especially with reference to population trends and the economic or living habits of people. Frequently used in reference to specific population groups, e.g., demography of professional people, blue collar workers, etc.
Didactic	- Systematic instruction of subject material.
Entrance Requirements	- Achievement or qualifications to be in evidence prior to admission to an establishment.
Essentials	- Standards required for accreditation or certification.
Evaluator	- A person who uses judgment or analysis for the purpose of rendering an opinion.

Faculty	- A person who designs and implements (implement means to carry out) a course of instruction.
Guidelines	- Suggestions for meeting a set of standards.
Horizontal Mobility	- Capability of moving from one task to another without additional education or experience.
Joint Review Committee	- A committee comprised of qualified members sponsored and appointed by related professional organizations, responsible for the survey and evaluation of educational programs in either Radiologic and Radiotherapy Technology, or in Nuclear Medicine Technology for the Council on Medical Education of American Medical Association.
Junior College	- Frequently an alternate title of Community College. Used extensively for educational institutions offering the first two years of a baccalaureate program.
Laboratory Simulators	- In radiologic technology, equipment designed to prepare students for the use of x-ray equipment or radiation equipment in patient care. Further defined as: energized-capable of emitting radiation; and, nonenergized- not capable of emitting radiation. Laboratory simulators are further described according to their purpose, e.g., circuitry simulators; radiographic simulators.
Overview	- An objective, general description of an item or topic.
Physical Plant	- The confines of an institution.
Practicum	- A unit of work performed that involves practical application of previously studied theory and the collection of data for future theoretical interpretation.
Proficiency Testing	- Method of determining how well an individual can perform or how much an individual can perform; proficient implies a thorough competence derived from training and practice.

Quarter Hour Credit - A unit equal to one fifty-minute period of instruction per week during a term equal to one-fourth of a 48 week academic year.

Reactor (Discussant) - A person who is responsible for giving a considered opinion on a presented topic.

Recorder - The person responsible for making a record of the conference and discussions.

Registration - The act or the fact of being listed on an official roster of qualified individuals, after completing an approved educational program, or passing a qualifying examination, or both.

Resource Material - A reserve or source of documented information pertaining to a particular subject to which one can refer for specific data or information.

Semester Hour Credit- A unit equal to one fifty-minute period of instruction per week during a term one-half of a nine-month academic year in length.

Sponsor - An agency or organization assuming responsibility for the operation of a program or activity.

Survey Team Member - A person authorized by the Joint Review Committee to conduct an on-site inspection of an educational program.

Survey Team Report - A written statement or account of facts related to an educational program in Radiologic Technology based on a site visit.

Syllabus - A guide for the presentation of an educational program including details of content.

Technical Institute - Occasionally, a title equivalent, in some States, to a community or junior college more specifically oriented to technical occupations.

Vertical Mobility - The ability to advance to jobs requiring additional experience and/or education. The ability to climb a career ladder.

APPENDIX III

Survey Summary of Twelve College Affiliated Radiologic Technology Programs

In the summer of 1970, personnel from the Bureau of Radiological Health toured 12 of the approximately 50 college-affiliated schools of radiologic technology. The resulting data, while not necessarily representative of all schools, provided a needed factual basis for planning the Conference.

Rad. tech. program	Program affiliation	Person or agency in charge of rad. tech. program	Written contract agreement between college and hospital(s)
Sinai Hospital of Baltimore, Inc.	Community College of Baltimore	Hospital radiologist	Yes
University of Nevada Las Vegas	Three hospitals	College - department chairman	Yes
Los Angeles City College	Six hospitals	College - department chairman	Yes
Merritt College Oakland, Calif.	Twenty-one hospitals	College - department chairman	Yes
Tacoma General Hospital Washington	Tacoma Community College	Hospital - chief radiologic technologist	No
St. Francis Hospital LaCrosse, Wisconsin	Viterbo College	Hospital - radiologist	No
Thornton Community College Harvey, Illinois	Three hospitals	College - program coordinator	Yes
Triton Community College River Grove, Illinois	Five hospitals	College - program coordinator	Yes
Greenville Tech. Educ. Center South Carolina	Two hospitals	College - department chairman	No
Northeastern University Boston	Fifty hospitals	College - department chairman	Yes
Emory School of Medicine Atlanta	DeKalb Junior College	Hospital - program director	Yes
Broome Tech. Binghamton, New York	Four hospitals	College department chairman	Yes

Advisory board to program	Rad. tech. program accredited by AMA	Program length	Degree awarded
No	Yes	30 mos.	Associate Arts
Yes	Yes	30 mos.	Associate Science
Yes	Yes	35 mos.	Associate Arts
Yes	Yes	27 mos.	Associate Arts
No	Yes	27 mos.	Associate Arts
Yes	Yes	24 mos.	Pending
Yes	Provisional	28-30 mos.	Associate Arts
Yes	Provisional	27 mos.	Associate Science
Yes	Pending	24 mos.	Associate Science
Yes	Yes	30 mos.	Associate Science
No	Yes	30 mos.	Associate Science
Yes	Yes	24 mos.	Associate Applied Science

Rad. tech. program	Number of months required for degree	Minimum semester credit hours for degree	Number of transferable units of credit	Months of internship needed for ARRT exam
Sinai Hospital of Baltimore, Inc.	24 mos.	66-68	Depends on accepting school	6 mos.
University of Nevada Las Vegas	24 mos.	66	Depends on accepting school	6-9 mos.
Los Angeles City College	20 mos.	60	60 to California schools	15 mos.
Merrit College Oakland, California	27 mos.	60	Depends on school	15 mos.
Tacoma General Hospital Washington	27 mos.	60	60 toward B.S. in x-ray field	
St. Francis Hospital LaCrosse, Wisconsin	Pending	Pending	Pending curriculum approval	
Thornton Community College Harvey, Illinois	28-30 mos.	69	Possibly 69	7 mos.
Triton Community College River Grove, Illinois	27 mos.	76	Approximately 63 toward B.S.	6-9 mos.
Greenville Tech. Educ. Center South Carolina	24 mos.	60+	60-64	
Northeastern University Boston	30 mos.	99 in 3 yrs. (4 years academic	51	
Emory School of Medicine Atlanta	24 mos.	68	54	6 mos.
Broome Tech. Binghamton, New York	24 mos.	98 quarter credits	Depends on accepting school-so far complete transfer	

Number of clinical hours (hospital) required in the two academic years			Total number of clinical hours in preparation for ARRT exam.	Continuity between didactic instruction and clinical experience
First year	Summer	Second year		
9 hours per week	3 mos.	12 hours per week	2500	X-ray course taught in hospital
9 hrs./wk.	10 wks.	11 hrs./wk.	2400 or more	(Recent) Coordinated
		3 hrs./wk.	2400	Coordinated visitation of school faculty
0				When practical
			2800 to 2500	X-ray course and practicum at hospital
			2400	Yes, coordinated visitation of school faculty
16 hrs./wk.	10 wks.	22 hrs./wk.	2432	
476 hrs.	304 hrs.	612 2nd yr. 1178 Internship	2570	2 hrs. instruction spent per week at hospital. Clinical instructors attend courses
			2400+	
			3600	
0	0	Late in second year (January to August)	2400	Initial training didactic gradually into practical aspect
16 hrs./wk.	3 mos.	24 hrs./wk.	2400	Coordinators at hospital (Chief Tech.), Weekly hospital film critque by college staff

Rad. tech. program	Funding	
	Operating budget - per student cost per yr.	Sources of money - operating budget
Sinai Hospital of Baltimore, Inc.	$1,700	City - 30% State - 45% Tuition - 25%
University of Nevada Las Vegas	$2,000	State, Tuition, $222 per semester
Los Angeles City College		State, small tuition, $200 per semester
Merritt College Oakland, California		State, District Board
Tacoma General Hospital Washington	$500/year at hospital $600/year at College	State Funds, tuition, $240-360
St. Francis Hospital LaCrosse, Wisconsin	$6,000	State plus tuition, $30/qt.
Thornton Community College Harvey, Illinois	$42/credit hour	State, $160-190 tuition per semester, local community
Triton Community College Rivergrove, Illinois		State and Dist. $5/sem. hour
Greenville Tech. Educ. Center South Carolina	$2,500	State = 20% Applachian - 40% Allied Health - 40% and $48/quarter
Northeastern University Boston		Tuition = 100%
Emory School of Medicine Atlanta	Varies as students change major, or decide after one yr. at college	Grants = 100%
Broome Tech. Binghamton, New York	$1,600	State - 33% County - 33% Student - 33%

Physical facilities				
Lecture rooms for rad. tech. courses		Demonstration labs.		Energized lab. on campus
College	Hospital	College	Hospital	
	One		Two	Use hospital units
Two		One		2, both energized
Three		One		One, four not energized
Two		Two		Two
			Diagnostic rooms	Use hospital units
	One		One	Use hospital units
One	One	One	Two	Use hospital units
One	One	One	At least one at ea. hospital	Use hospital units, Also have 2 dental units
Three		One		One
Two		One		
Numerous	6	Two	Twelve	Use hospital units
Three	One per hospital	One	Diagnostic rooms	One

	Physical facilities (cont'd)		Faculty assigned to program	
	Darkroom facilities on campus		Number of full-time instructors	
Rad. tech. program	Manual	Automatic	College	Hospital
Sinai Hospital of Baltimore, Inc.				Two
University of Nevada Las Vegas	One		Two	
Los Angeles City College	Three	One	Three	
Merritt College Oakland, California	One	One	Five	
Tacoma General Hospital Washington				One
St. Francis Hospital LaCrosse, Wisconsin				Two
Thornton Community College Harvey, Illinois			One	
Triton Community College River Grove, Illinois	One (Dental)	One	Two	
Greenville Tech. Educ. Center South Carolina	One	One	Two	
Northeastern University Boston			Four	Thirty-Six
Emory School of Medicine Atlanta	Two	One	One	Three
Broome Tech. Binghamton, New York	One	One	Three	

Faculty assigned to program (cont'd)		Estimated faculty-to-student ratio	Entrance requirements
Number of part-time instructors			Open door policy
College	Hospital		
	Two	Set by College	Yes
Two		4/28	Yes
Three		1/30	Yes
Two		1/25	Yes
	Two	1/30	Yes
		1/6	Yes
One	Two	1/30	Yes
	Five	2/42 at college 1/10 at hospital	Yes
	Two	1/12	Yes
	Fifty	1/6	Yes, program restrictive
One	Three		Yes
Five	Four	1/18	To college but not necessarily to curriculum

Rad. tech. program	Entrance requirements (cont'd)		
	Age	Education	Health
Sinai Hospital of Baltimore, Inc.	All - but recruit the 17-35 year olds	High School diploma or equivalent	Physical exam
University of Nevada Las Vegas	None University requirements	High school diploma. 2.3 grade point or better	Physical exam by private M.D.
Los Angeles City College	Not over 35-hospital policy	High school diploma or 18th birthday	Physical exam on campus. Blood tests & chest x-ray
Merritt College Oakland, California	Over 18	GED; High school diploma not required	Physical exam by private M.D.; Polio immunization
Tacoma General Hospital Washington	Recruit the 18-30 year olds	High school diploma; 2.6 grade point or better	Physical exam in hospital; Blood tests & chest x-ray
St. Francis Hospital LaCrosse, Wisconsin	Recruit the 18-35 year olds	High school diploma or equivalent	Dental exam, chest x-ray, immunizations
Thornton Community College Harvey, Illinois	No	High school diploma or equivalent	Physical exam by private M.D.
Triton Community College River Grove, Illinois	No	High school diploma or equivalent	Physical exam by private M.D.; Blood test & chest x-ray
Greenville Tech. Educ. Center South Carolina	No	High school diploma or equivalent	Physical exam by private M.D.
Northeastern University Boston	18 or above required	High school diploma or equivalent	Physical exam Blood test; chest x-ray, Immunizations
Emory School of Medicine Atlanta	No	High school diploma or GED	Medical report
Broome Tech. Binghamton, New York	17-45	High school diploma - 2 units math, 2 units science	Physical by private phys. chest x-ray

Entrance requirements (cont'd)		Available financial support		
Pre-entrance exams	Personal interviews	Stipends	Scholarships	Loans
ACT, Maryland Employment Test	College & hospital also includes parents	1st - $25/mo. 2nd - $50/mo. Final 6 mos. - $150/mo.	Community help	Yes
ACT, GATB test	None required for Univ., but yes for Department	Negotiated between hospital and student	Yes	Yes
SCAT	Yes, after the first year	None, 1st & 2nd years; Internship $180-385/mo.	None needed	Yes
SCAT	Yes	Clinical interns only	None needed	Yes
GATB and State employment test	Yes	Last 9 months $1.65/hr.	Yes, but no applicants to date	Yes
School entrance test battery DAT	Yes: School, faculty, radiology department	2nd year only	None	Yes
ACT	No	Last 7 months	Community help	Yes
ACT	Yes: College and hospital	$2,980 for 30 month period	Yes, but no applicants to date	Yes
None	Yes: College and radiology department	Hospital pays $1.60/hour plus meals	Yes	Yes
Math placement test	Yes	Paid at each hospital	None	Yes
CEEB	Yes	Not during the 8 quarters at college	Yes	Yes
CEEB	Yes - College admissions officers and staff	During summer - hospitals are now refusing to cooperate	Yes	Yes

Rad. tech. program	Student enrollment		
	1st year students	2nd year students	Number graduates last year
Sinai Hospital of Baltimore, Inc.	20: 3-male 17-female	18: 6-male 12-female	14
University of Nevada Las Vegas	20: 7-male 13-female	8: 0-male 8-female	7
Los Angeles City College	187: 100-male 87-female	34: 16-male 18-female	34
Merritt College Oakland, California	75: 25-male 50-female	40: 15-male 25-female	25
Tacoma General Hospital Washington	7: 1-male 6-female	6: 0-male 6-female	3
St. Francis Hospital LaCrosse, Wisconsin	16: 2-male 14-female	14: 0-male 14-female	10-14
Thornton Community College Harvey, Illinois	14: 7-male 7-female	21: 4-male 17-female	None yet
Triton Community College River Grove, Illinois	8: 4-male 4-female	11: 5-male 6-female	None yet
Greenville Tech. Educ. Center South Carolina	15: 3-male 12-female	None yet	None yet
Northeastern University Boston	220: 30-male 160-female	180: 20-male 160-female	180-200
Emory School of Medicine Atlanta	6: 3-male 3-female	3	None yet
Broome Tech. Binghamton, New York	34: 12-male 22-female	15: 7-male 8-female	16

Courses in liberal arts							
P.E.	Electives	Health	Gen. Eng.	Writing (Comp.)	Lit.	Speech	Humanities
2	6-7			6		3	3
4				6			
2	3	2	3	2^E		3	
3		3	9*	*	*	*	
3	10			10		5	
	9					9	
2	9			3	3		
4		2		6		3	
				3		12	
	6		6				
10				10	10		
			9	2		3	

*-The total credit is split among the other courses or the courses are given in combination.

E-Designated as an elective.

Rad. tech. program	Courses in liberal arts (cont'd)					
	Psychology	Sociology	Hist.	Bus.	Pol. Sci.	Sub-total Credit hrs.
Sinai Hospital of Baltimore, Inc.	6	3		3		32-33
University of Nevada Las Vegas	3		6			19
Los Angeles City College	3		6			24
Merritt College Oakland, California			5	4	5	29
Tacoma General Hospital Washington	5	5				38
St. Francis Hospital LaCrosse, Wisconsin	5	5		3		31
Thornton Community College Harvey, Illinois	3					20
Triton Community College River Grove, Illinois	1	3				19
Greenville Tech. Educ. Center South Carolina	8					23
Northeastern University Boston	6	6		6		30
Emory School of Medicine Atlanta			5	5	5	45
Broome Tech. Binghamton, New York	3	3	3		3	26

Courses in basic sciences						
Physics	Anat.	Physio.	Bio	Chem.	Math.	Sub-total credit hours
	4					4
8			2		As elec.	10
3	3	3		3	5^E	17
	4	4			0-3	8-11
5	5*	5*	10			25
9	4*	4*			5	22
7	3				3	13
3	5*	*			3	11
5	4*	4*		4	8	25
9	6*	*	12		6	33
	5*	5*	5		10	25
9	3	3			3	18

*-The total credit is split among the other courses or the courses are given in combination.

E-Designated as an elective.

Rad. tech. program	Courses in radiologic technology			
	Gen. rad. tech.	Rad. Anat. & Physio.	Rad. physics	Rad. chem.
Sinai Hospital of Baltimore, Inc.	27		4 (combined in one course)	
University of Nevada Las Vegas	18	8	8	4
Los Angeles City College	22	8	3	
Merritt College Oakland, California	51		16	
Tacoma General Hospital Washington	40			
St. Francis Hospital LaCrosse, Wisconsin	64		2	
Thornton Community College Harvey, Illinois	34	3		
Triton Community College River Grove, Illinois	30	*	*	*
Greenville Tech. Educ. Center South Carolina	76		5	3
Northeastern University Boston	30			
Emory School of Medicine Atlanta	33		5	
Broome Tech. Binghamton, New York	31	1	1	In with gen. rad. tech.

*-The total credit is split among the other courses or the courses are given in combination.

Courses in radiologic technology (cont'd)		All courses: grand total credit hours
Seminars Internship	Sub-total credit hours	
	31	67-68 Semester units
3	37	66 Semester units
	22	63 Semester units
38	105	142-145 Quarter units
13	53	116 Quarter units
14	80	133 Quarter units
4	41	74 Semester units
13	43	76 Semester units
26	110	158 Quarter units
12	42	99 Quarter units
2	38	108 Quarter units
30	63	107 Quarter units

Rad. tech. program	Records kept on student performance				
	Grades	Student evaluations	Formal Staff reports	Clinical work	Attendance
Sinai Hospital of Baltimore, Inc.	Yes	Yes	Yes		
University of Nevada Las Vegas	Yes	Yes	Yes	Yes	Yes
Los Angeles City College	Yes				Yes
Merritt College Oakland, California	Yes	Yes	Yes	Yes	Yes
Tacoma General Hospital Washington	Yes	Yes		Yes	
St. Francis Hospital LaCrosse, Wisconsin	Yes	Yes		Yes	Yes
Thornton Community College Harvey, Illinois	Yes	Yes	Yes	Yes	Yes
Triton Community College River Grove, Illinois	Yes	Yes	Yes	Yes	Yes
Greenville Tech. Educ. Center South Carolina	Yes	Yes	Yes	Yes	Yes
Northeastern University Boston	Yes	Yes	Yes	Yes	Yes
Emory School of Medicine Atlanta				Yes	
Broome Tech. Binghamton, New York		Yes	Yes	Yes	Yes

APPENDIX IV

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APPENDIX V

PICTORIAL HIGHLIGHTS

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NOT REPRODUCIBLE

The ABSTRACT CARDS below are designed to facilitate document retrieval using Coordinate Indexing. They provide space for an accession number (to be filled in by the user), suggested keywords, bibliographic information and an abstract.

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Accession No.

U.S. Department of Health, Education, and Welfare, PHS, FDA, Bureau of Radiological Health: NATIONAL CONFERENCE ON COLLEGE AFFILIATED EDUCATIONAL PROGRAMS IN RADIOLOGIC TECHNOLOGY.

U.S. Department of Health, Education, and Welfare, PHS, FDA, Bureau of Radiological Health, Publication No. (FDA) 72-8011 (BRH/DMRE 72-2) June 1971, 279 pp. (limited distribution).

ABSTRACT: This publication contains the proceedings of a conference held at the University of Maryland on December 8-11, 1970. The conference sponsored by the Bureau of Radiological Health, U.S. Public Health Service, served to identify the problems encountered

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Included are 1) formal presentations, 2) final reports and recommendations of the four workshop groups (curriculum, administration, manpower and external influences), and 3) information obtained in a survey of twelve selected schools of radiologic technology.

KEYWORDS: Training, Paramedical, College-affiliated, Radiologic technology, Resource material, Didactic, Practicum.

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TECHNICAL REPORTS

(continued from inside of front cover)

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MORP 68-9	Development and Evaluation of an Automatic Collimator for Medical Diagnostic X-ray Machines (PB 180 528 $6.00)
MORP 68-10	Survey of the Use of Radionuclides in Medicine: Preliminary Report (Superseded by BRH/DMRE 70-1)
MORP 68-11	Dental Surpak Summary Report (PB 184 356 $3.00)
MORP 68-12	Particle Accelerator Safety Manual (Supt. of Doc., GPO-$1.25) (PB 178 325 - microfiche only)
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BRH/DMRE C70-2	Automatic Data Processing System Study for Massachusetts General Hospital Diagnostic Radiology Department (PB 193 937 $3.00)
BRH/DMRE 70-3	A Training Manual for Nuclear Medicine Technologists (Supt. of Doc., GPO-$1.75) (PB 196 441 - microfiche only)
BRH/DMRE 70-4	Cyclotron Production of ^{123}I - an Evaluation of the Nuclear Reactions Which Produce This Isotope (PB 196 162 $3.00)
BRH/DMRE 70-5	The Use of Radioactive Materials in Gas Chromatography (PB 195 970 $3.00)
BRH/DMRE 71-1	Summary of Federal Regulations for Packaging and Transportation of Radioactive Materials (Supt. of Doc., GPO-$0.50) (PB 197 698 - microfiche only)
BRH/DMRE 71-2	X-ray Fluoroscopic Screens - History, Crystal Kinetics, Preliminary Report on "Aging" (Supt. of Doc., GPO-$0.60) (PB 198 239 - microfiche only)
BRH/DMRE 71-3	Storage and Handling Devices for Radiumm
BRH/DMRE 71-4	State and Federal Control of Health Hazards from Radioactive Materials other than Materials Regulated under the Atomic Energy Act of 1954
BRH/DMRE 71-5	Nuclear Medical Technology Training